UC-8430 WinCE User's Manual

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UC-8430 WinCE User's Manual

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Introduction

Microsoft® Windows® CE 6.0 is an open, scalable, 32-bit operating system (OS) that allows you to build a wide range of innovative, small footprint devices. A typical Windows® CE-based device is designed for a specific use, and often runs disconnected from other computers, or distributed as a front-end to a centralized host. Examples include enterprise tools, such as industrial controllers, communications hubs, point-of-sale terminals, and display devices, such as HMI, advertisement appliances, and interactive panels.

Moxa's UC-8430 ready-to-run embedded computer provides Windows® developers with an excellent Windows® CE solution. Moxa's extensive experience in kernel development on embedded small footprint communication devices provides the intense technological skills required while porting the Windows® CE 6.0 kernel.

The following topics are covered in this chapter:

- **Overview**
- **Model Descriptions and Package Checklist**
- **Software Specifications**
  - Application Development Environment
  - Networking and Communications Capabilities
  - Supported Servers and Daemons
  - Graphics and Multimedia Tools
- **Firmware Build Versions**
- **Memory and File Systems**
- **Dual Display**
- **Audio**
- **Hive-based Registry (not RAM-based)**
- **Inserting a CompactFlash Card**
- **Inserting a USB Mass Storage Device**
- **RS-232/422/485 Serial Ports**

Overview

The UC-8430 embedded computer comes with 8 RS-232/422/485 serial ports, 3 Ethernet ports, dual displays, 4 digital input channels, 4 digital output channels, a CompactFlash socket, and 6 USB 2.0 hosts.

The computer uses the Intel XScale IXP435 533 MHz RISC CPU. This powerful computing engine supports several useful communication functions, but will not generate too much heat. The built-in 32 MB NOR Flash ROM and 256 MB SDRAM give you enough memory to run your application software directly on the UC-8430, and the 128 MB NAND Flash can be used to provide additional data storage.

Moreover, the 256 KB SRAM offers a better data retention mechanism for avoiding data loss. The UC-8430 computer comes with 8 RS-232/422/485 serial ports, digital I/O, and has 3 LAN ports, making it ideal as a communication platform for industrial applications that require network redundancy. As an added convenience, the UC-8430 comes with dual VGA outputs; this is particularly helpful when establishing an industrial application at the remote field site.

The UC-8430 comes with the Linux 2.6 or Windows CE 6.0 platform pre-installed to provide an open software operating system for software program development. Software written for a desktop PC can be easily ported to the UC-8430 platform by using a common compiler, without needing to modify the code. This makes the UC-8430 an optimal solution for use with industrial applications, but with minimal cost and effort.

A wide temperature model of the UC-8430, designed to operate reliably in temperatures ranging from -40 to 75°C, is also available.

Model Descriptions and Package Checklist

UC-8430-CE

RISC-based industrial embedded computer with 8 serial ports, 4 DIs, 4 DOs, 3 LANs, CompactFlash, Dual VGA, Audio, 6 USB, Windows CE 6.0 OS, -10 to 60°C operating temperature

UC-8430-T-CE

RISC-based industrial embedded computer with 8 serial ports, 4 DIs, 4 DOs, 3 LANs, CompactFlash, Dual VGA, Audio, 6 USB, Windows CE 6.0 OS, -40 to 75°C operating temperature

Both models are shipped with the following items:

- 1 UC-8430 Embedded Computer
- Wall-Mounting Kit
- DIN-Rail Mounting Kit (attached to the product’s casing)
- Quick Installation Guide
- Document & Software CD
- Ethernet Cable: RJ45 to RJ45 cross-over cable, 100 cm
- CBL-4PINDB9F-100: 4-pin header to DB9 female console port cable, 100 cm
- Universal Power Adaptor
- Product Warranty Statement

NOTE: Notify your sales representative if any of the above items are missing or damaged.

Software Specifications

UC-8430 WinCE ready-to-run embedded computers are network centric computers that are designed to be programmable for embedded communication applications. The software features of the UC-8430-CE are listed below:

Application Development Environment

To make the UC-8430-CE easy to program, its Windows® CE environment provides the following common, popular application development features that make programming as convenient and easy as in a PC environment.

- **C Libraries and Run-times—**Compared to the C libraries and run-times used on a desktop PC running Windows®, the C libraries and run-times on an UC-8430-CE are a subset of the WIN32 APIs. They support full ANSI C run time, standard input/output library, standard input/output ASCII library, and standard ASCII string functions. In addition, they support C++ compiler exception handling and Run-Time Type Information (RTTI) equivalent to desktop C++ compilers.
- **Component Services (COM and DCOM)**—The Common Object Model (COM) is an operating system-independent, object-oriented system for creating binary software components that can interact with other COM-based components in the same process space, in other processes, or on remote machines.
- **Microsoft® Foundation Classes (MFC)**—MFC is a comprehensive class library and complete object-oriented application framework designed to help build applications, COM components, and controls.
- **SOAP Toolkit**—SOAP is an XML-based protocol for object exchange and remote procedure calls. Microsoft® Windows® CE 6.0 provides functionality similar to the SOAP Toolkit version 2 on a desktop computer. The SOAP Toolkit provides a layer that allows COM objects to use SOAP as the transport protocol for remote procedure calls and to interact with Web services.
- **Microsoft® .NET Compact Framework 3.5**—Offers a choice of languages, Microsoft® Visual Basic® and Microsoft® Visual C#, and eliminates the common problems faced with language interoperability.
- **XML**—Provides the Document Object Model (DOM) for XML-based functionality, supports XML Query Language (XQL) and XPATH, Extensible Style Sheet Language Transformations (XSLT) that enable you to transform one class of XML document into another, SAX2 support for event-based parsing of XML documents, including MSXML Writer, and parsing based on Simple API for XML (SAX) for resource-constrained target devices.
- **Winsock 2.2**—Provides enhanced capabilities over Winsock 1.1, including installable service providers for additional third-party protocols, as well as Media sense.

Networking and Communications Capabilities

For network-centric embedded application usage, the UC-8430-CE not only provides powerful communication hardware interfaces, including dual Ethernet and 3-in-1 serial ports, but also supports the networking and communications capabilities that are built into Windows® CE 6.0. The following features are supported:

- **Simple Network Management Protocol (SNMP)—**Monitors remote connections to the network.
- **Simple Network Time Protocol (SNTP) Client**—Provides support for synchronizing the device's system time with an SNTP server, and supports Daylight Savings Time.
- **Serial Communications**—In addition to the 16550 UART driver bound to a debug port and the console port, a special driver for 8 additional Moxa serial ports is also included.
- **Network Utilities (IpConfig, Ping, Route)**—Utilities for troubleshooting various network problems.
- **TCP/IP**—Includes IP, Address Resolution Protocol (ARP), Internet Control Message Protocol (ICMP), Internet Group Membership Protocol (IGMP), Transmission Control Protocol (TCP), User Datagram Protocol (UDP), name resolution and registration, and DHCP.

Supported Servers and Daemons

In addition to development and communication capabilities, the UC-8430-CE is also embedded with the following services and daemons. These common and easy-to-use application servers help users migrate the UC-8430 embedded computer to industrial communication applications easily and conveniently.

- **Telnet Server—**A sample server that allows remote administration through a standard Telnet client.
- **FTP Server**—A sample server used for transferring files to and from remote computer systems over a network using TCP/IP.

- **File Server**—The file server functionality in Microsoft® Windows® CE enables clients to access files and other resources over the network.
- **Web Server (HTTPD)**—Includes ASP, ISAPI Secure Socket Layer support, SSL 2, SSL 3, and Transport Layer Security (TLS/SSL 3.1) public key-based protocols, and Web Administration ISAPI Extensions.
- **Dial-up Networking**—Consists of RAS client API and the Point to Point Protocol (PPP). RAS and PPP support Extensible Authentication Protocol (EAP) and RAS scripting.
- **Watchdog Service**—A CPU Hardware function for resetting the CPU in a user specified time interval. You must call a Moxa library function to trigger the reset action.

Graphics and Multimedia Tools

- **Graphics Device Interface (GDI)—**Provides information about the fundamental graphics architecture for Windows CE.
- **DirectDraw Display Drivers**—Provides information about creating a display driver that supports DirectDraw.
- **Audio Codecs and Renderers**

G.711 Audio Codec
GSM 6.10 Audio Codec
IMA ADPCM Audio Codec
MP3 Codec
MPEG-I Layer 1 and 2 Audio Codec
MS ADPCM Audio Codec
Wave/AIFF/au/snd File Parser
Waveform Audio Renderer
WMA Codec
WMA Voice Codec
WMAPro over s/PDIF Packetizer

- **Video Codecs and Renderers**

DirectShow Video Codec
MPEG-I Video Codec
MS RLE Video Codec
Overlay Mixer
Video/Image Compression Manager
EMA/MEPG-4 Video Codec

Firmware Build Versions

There are two ways to determine the version of your UC-8430-CE computer's firmware. You will need to know the firmware version to identify which features your UC-8430-CE supports.

- Examine the welcome message after you log on to the computer.
- Log on to the web-based management system (described in a later chapter) to view the system information.

Memory and File Systems

The SDRAM has 256 MB of memory space, of which 192 MB is allocated for the main memory in which the operating system and user applications run. The kernel image occupies the rest of the space.

The UC-8430-CE's internal file system controls access to the ROM, and also provides file storage in the object store, which is in the RAM. The ROM file system provides persistent storage for applications and the data used by the applications, even when the main power supply is lost. It integrates the read-only files that are stored

in Flash ROM with the read/write files of both an application and a user. In the UC-8430-CE computer, a child directory named "NORFlash" under the root indicates the ROM storage of the flash memory is 32 MB.

The root directory is a 44 MB RAM file system. It can be used for storing temporary files for your applications. However, do not place persistent files or applications in the root directory, because they will be wiped out when the system is shut down. Instead, place them in the "NORFlash" directory.

The file systems for storage devices connected through the USB port and CompactFlash are placed in the root of the internal file system. If you intend to use these devices to port data between your PC and the UC-8430-CE computer, format them using the FAT file system on your PC.

Dual Display

UC-8430-CE comes with 2 VGA outputs and support clone-mode feature.

Audio

The UC-8430-CE has a line-in for audio recording and an audio output for playing sound. This is a limitation for UC-8430-CE that is "You can do audio recording or audio playing at the same time; you can't do audio recording and audio playing simultaneously."

Hive-based Registry (not RAM-based)

The registry for the UC-8430-CE is a hive-based registry instead of a RAM-based registry. The hive-based registry stores registry data in files, or hives, which can be kept on any file system. This removes the need for performing backup and restore on power off.

Inserting a CompactFlash Card

The UC-8430-CE is equipped with a CompactFlash slot of type II that supports cards of both types I and II. A mass storage card is considered to be a standard attachment to the computer. Thus, when an empty mass storage card is inserted into the slot, the computer automatically formats it to the FAT system. This process takes a few minutes to complete. When a mass storage card is inserted, the UC-8430-CE creates a directory named "HardDisk" under the root directory and the newly created directory serves as a link to the storage. The UC-8430-CE does not support PNP (plug and play) and hot swap for CompactFlash storage devices. Users must switch off the power and then insert the CompactFlash storage device in the slot. When the power is switched on again, the UC-8430-CE will detect the CompactFlash storage device. Be sure to shut off the power before removing the CompactFlash storage device.

The following table describes the compatible CompactFlash storage devices that have been tested and found to be compatible with the UC-8430-CE.

Vendor	Device Name	Size
ScanDisk	Ultra II	1 GB
Transcend	Compact Flash 80X	512 MB
Apacer	Photo CIENO	2 GB
Unigen	Compact Flash card	128 MB

Inserting a USB Mass Storage Device

When an empty USB storage device is plugged into the USB slot on the UC-8430-CE's rear panel, the computer automatically formats device to the FAT system.

When the first USB mass storage device is plugged in, a directory named "USBDisk" is created in the internal file system under the root directory as a link to the storage device. The directory created for the second USB device is "USBDisk2."

RS-232/422/485 Serial Ports

The UC-8430-CE computer comes with 8 high performance serial ports named from "COM3" to "COM10". All of them are designed to provide reliability, high-speed and 3-in-1 (i.e., RS-232, RS-422, and RS-485) operation mode switch for your diverse applications. Each of these ports supports baudrate settings up to 921600 bps.

You can use the interface utility setinterface.exe to change or display your port interface. Ex.: Type "setinterface COM3: 1" to change the port interface to RS-485 2W.

```
\>setinterface
ModelName:UC-8430-CE
COM3: = RS-232
COM4: = RS-232
COM5: = RS-232
COM6: = RS-232
COM7: = RS-232
COM8: = RS-232
COM9: = RS-232
COM10: = RS-232
\> setinterface –h
SetInterface [COMx:] [mode]
       mode:   0 (RS232)
       mode:   1 (RS485 2 Wire)
       mode:   2 (RS422)
       mode:   3 (RS485 4 Wire)
e.g.
       SetInterface COM5: 2          Change the COM5: mode to RS422
       SetInterface $device\COM10 3    Change the COM10: mode to RS485 4wire
You can either enable or disable the FIFO by the utility , "setfifo". Ex.: Type "setfifo
COM3: 0" to disable FIFO of COM3. or type  "setfifo COM3: 1" to enable FIFO of COM3
After that, you can check the FIFO status by type "setfifo"
\> setfifo COM3: 0
Set FIFO success
\> setfifo
COM3 FIFO = Disabled
COM4 FIFO = Enabled
COM5 FIFO = Enabled
COM6 FIFO = Enabled
COM7 FIFO = Enabled
COM8 FIFO = Enabled
COM9 FIFO = Enabled
COM10 FIFO = Enabled
```

2

Getting Started

In this chapter, we explain how to operate an UC-8430-CE computer from a PC. The PC will be referred to as a development workstation and the UC-8430-CE computer will be called the target computer.

We describe the steps needed for some operations, such as setting the system time, troubleshooting network connectivity, etc. Some of these operations can be done using system commands after gaining access to the computer, and others can be done with a web-based management system, as described in a later chapter.

The following topics are covered in this chapter:

- **Powering on the UC-8430**
- **Resetting the UC-8430-CE Computer**
- **Rebooting the UC-8430-CE Computer**
- **Boot Loader**
- **Operating the UC-8430-CE Computer via Serial Console**
- **Changing the Network Settings**
- **Virtual Private Network (VPN)**
- **Operating the UC-8430-CE Computer via Telnet**
- **User/Group Management**
- **Adjusting the Time Zone**
- **Adjusting the System Time**
- **Starting and Stopping Services**
- **Troubleshooting Network Connectivity**
- **Simple Network Management Protocol (SNMP)**
  - SNMP Agent
  - SNMP Manager
- **Accessing Files through File Sharing**

Powering on the UC-8430

To boot up the system, connect the power source to the power input located on the computer's rear panel. It takes about 5 seconds for the system to boot up. You will hear a clear "BEEP" sound when the boot up procedure is finished. Once the system is ready, the "Ready" LED will light up and stay on until you shut down the computer.

Resetting the UC-8430-CE Computer

Warm-Start: When powering on, push the "Reset" button briefly (for less than1 second). The computer will reboot automatically.

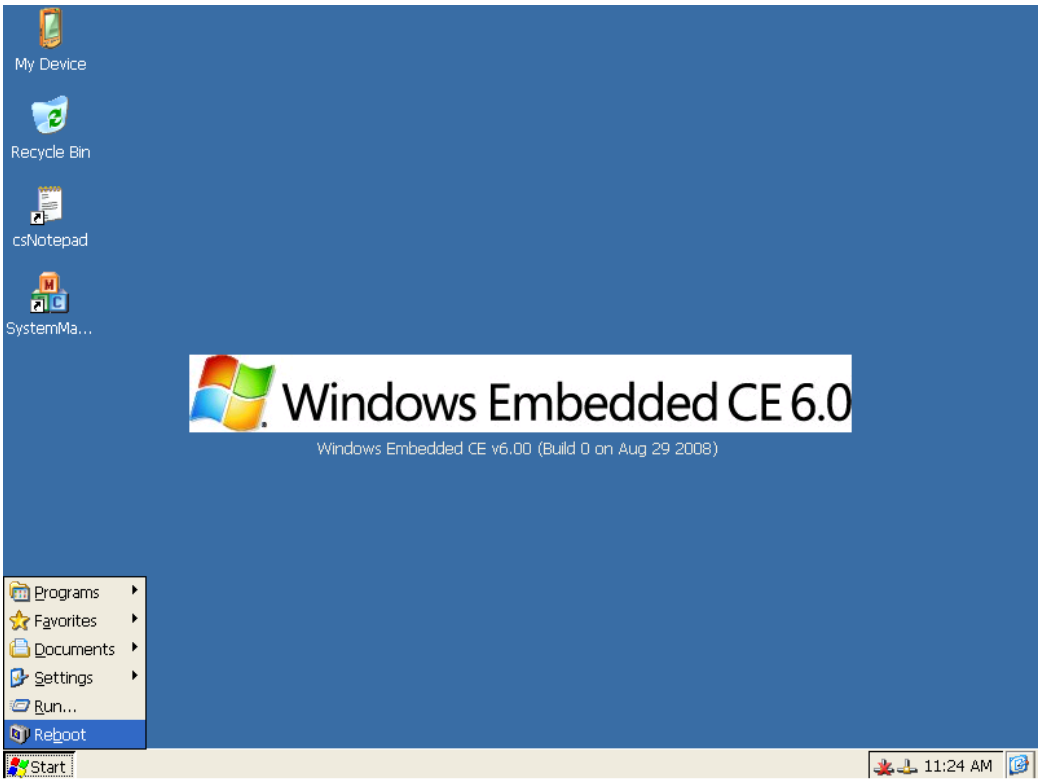
Cold-Start: Switch the power off and then on again. The computer will reboot automatically.

Reset to Factory Defaults (Configuration only): If the computer is not working properly and you would like to reset it to factory default settings, press and hold the "Reset" button for 5 seconds as the operating system is starting up. The buzzer sounds while the factory default settings are being loaded. After the factory default settings have finished loading, the computer will reboot automatically. Do not confuse this action with "Warm-Start."

Reset to Factory Defaults (Configuration and file system): If the computer will not start up, you **must** go to the Boot Loader and format the flash storage. Once the flash storage has been reformatted, restart the computer.

Rebooting the UC-8430-CE Computer

While the computer is powering on, click the "start" button and select "Reboot." The computer will reboot automatically.



Boot Loader

Three functions are provided to enhance the stability of the operating system.

- **Reset to default—**This function allows users to load the factory default into the UC-8430.
- **Format storage flash**—CE 6.0 is a FAT-based system. The system cannot work well when the FAT table is crashed. This function allows users to format the file system and reboot UC-8430.
- **Firmware upgrade**—The latest firmware can be downloaded from Moxa's website. See Appendix A for instructions on how to upgrade the firmware.

Use the following procedure to access the boot loader menu from the serial console:

1. Power off the UC-8430-CE.
2. Connect the serial console cable to your PC.
3. Go to **[Start]** → **[Programs]** → **[Accessories]** → **[Communication]** → **[Terminal]** to create a new terminal. Use these settings: Baudrate = 115200, Hardware Flow Control = None, Data bits = 8, Parity = None, Stop bits = 1, Terminal = VT100.
4. Activate this terminal window on your PC.
5. Hold down the "DEL" key.
6. Power on the UC-8430-CE.

Operating the UC-8430-CE Computer via Serial Console

The serial console port gives users a convenient way of connecting the development workstation to the console utility of the target computer. This method is particularly useful when using the target computer for the first time.

After connecting the serial cable, return to the development workstation and start a terminal program (e.g., HyperTerminal). Use the following console port settings.

Baud rate	115200 bps
Parity	None
Data bits	8
Stop bits	1
Flow Control	None
Terminal	VT100

Next enter the login name and password. The default values are both **admin**.

Login: admin
Password: admin

Changing the Network Settings

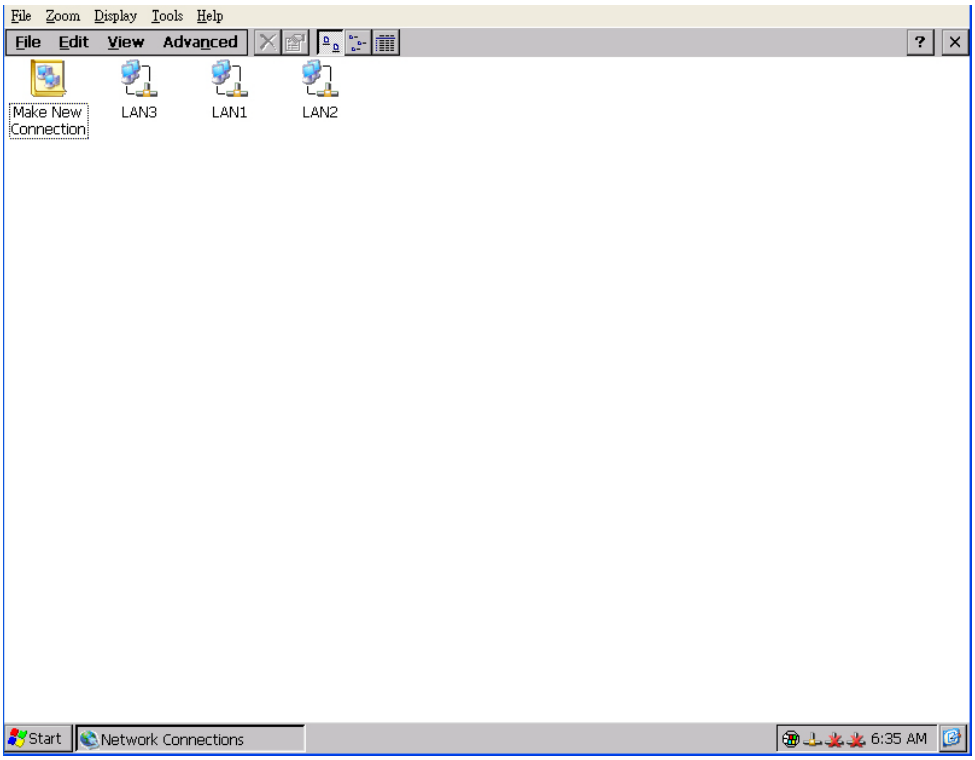
The UC-8430-CE computer comes with three network interfaces. The default IP addresses and netmasks of the network interfaces are as follows:

	Default IP Address	**Netmask**
LAN 1	DHCP	DHCP
LAN 2	192.168.4.127	255.255.255.0
LAN3	192.168.4.127	255.255.255.0

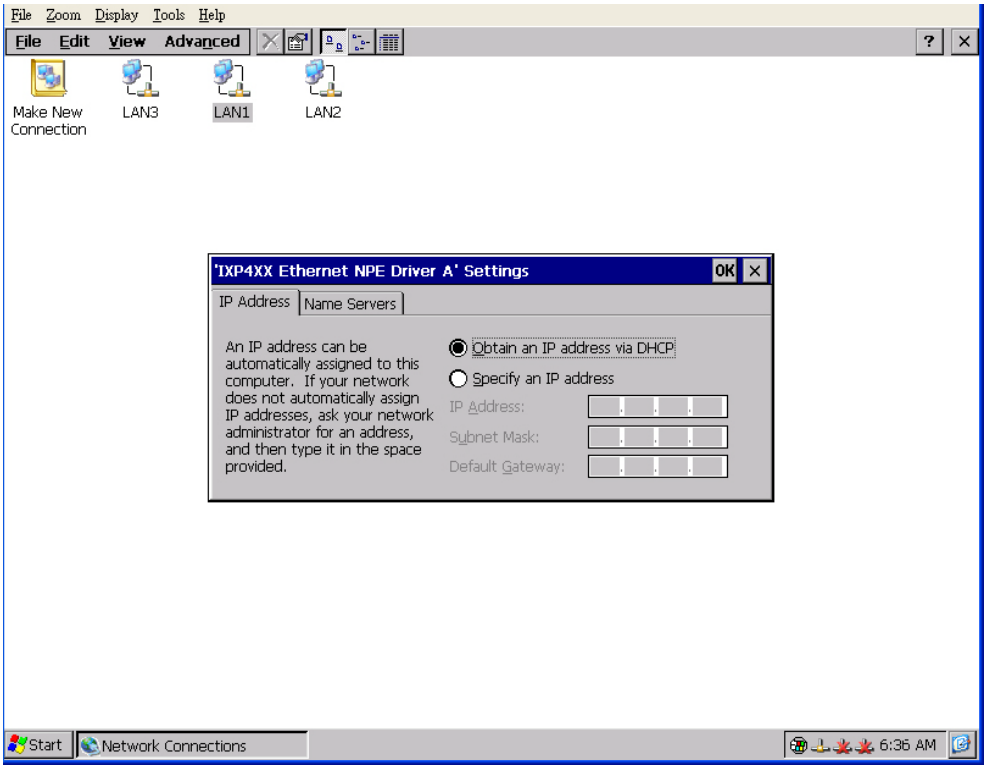
There are two methods to change the network settings of the UC-8430: Use the network settings function of the OS, or use the Serial Console connection.

Use the following procedure to change your network settings.

1. Go to **[Start]** → **[Settings]** → **[Network and Dial-Up Connections**].



2. Right click the **LAN** icon and the click **Property**.


File Zoom Display Tools Help
File Edit View Advanced
Make New Connection
LAN3
LAN1
LAN2
'IXP4XX Ethernet NPE Driver A' Settings
OK
IP Address
Name Servers
An IP address can be automatically assigned to this computer. If your network does not automatically assign IP addresses, ask your network administrator for an address, and then type it in the space provided.
Obtain an IP address via DHCP
Specify an IP address
IP Address:
Subnet Mask:
Default Gateway:
Start
Network Connections
6:36 AM

3. Click **OK**.

Another method to change the network setting is via Serial Console. Refer to "Operating the UC-8430-CE Computer via Serial Console", and connect the UC-8430. Type netconfig -h to get help on this utility.

To illustrate how to match the settings to your application, let's assume that your development workstation has a LAN port at 192.168.1.5, and the Domain Name Server (DNS) is at 192.168.2.6. In this case, you should issue the following command:

```
\> netconfig –n LAN1 –i 192.168.1.5 –m 255.255.255.0 –g 192.168.1.254 –d 192.168.2.6
```

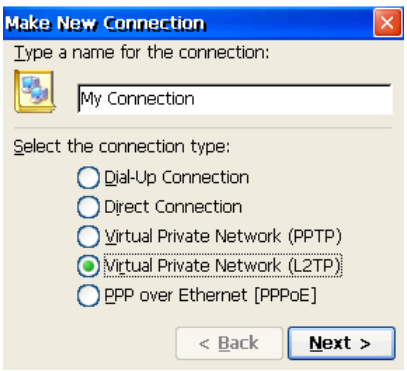
Use netconfig command without parameters to view the new settings:

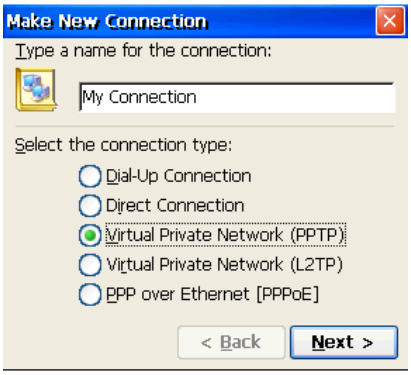
```
\> netconfig
LAN1 Interface Configuration:
IP Address:     192.168.1.5
SubNet Mask:    255.255.255.0
Gateway:    192.168.1.254
DNS:        192.168.2.6
LAN2 Interface Configuration:
IP Address:     192.168.4.127
SubNet Mask:    255.255.255.0
Gateway:
DNS:
```

Virtual Private Network (VPN)

Windows Embedded CE supports Virtual Private Networks (VPNs). The VPN support in Windows Embedded CE includes Layer Two Tunneling Protocol (L2TP), IP Security Protocol (IPSec), and Point-to-Point Tunneling Protocol (PPTP). L2TP/IPSec enables enhanced security for Virtual Private Network (VPN) client connections from Windows Embedded CE-based devices to corporate servers. PPTP is a Network protocol that adds a security infrastructure for the transfer of data from a remote client to a private enterprise server, which creates a VPN by using TCP/IP-based data networks.

Currently, this function is supported only by the UC-8430-CE. For VPN questions concerning the UC-8430-CE, please contact Moxa's Technical Support team.





Operating the UC-8430-CE Computer via Telnet

Before operating your UC-8430-CE computer using a Telnet client, we suggest that you change the network settings of the computer (see an earlier section) so that at least one of the two network ports is on the same LAN as your development workstation.

Use a cross-over Ethernet cable to connect your development workstation directly to the target computer, or a straight-through Ethernet cable to connect the computer to a LAN hub or switch. Next, use the Telnet client on your development workstation to connect to the Telnet console utility of the target computer. Once a connection is established, type the login name and password as requested to log on to the computer.

After logging in via the console port or a Telnet client, several busybox commands are available to operate the computer. Use **HELP** to display all of the commands, or type **HELP [command name]** to display extended help for the selected command. Some of the commands, such as **DATE** and **TIME** are very useful for managing the computer's the system time. Other commands, such as **DIR** and **MKDIR** are good utilities for file management. For example, to inspect the file structure of the root directory, simply type **DIR**.

```
\> dir /b
NORFlash
```

```
My Documents
Program Files
Temp
Windows
```

User/Group Management

User Group—You should assign specific services, such as ftp and Telnet, to defined user groups so that these services are accessible only by the users within the permissible user group. Three user groups, namely **ftpd**, **telnetd**, and **httpd**, are created by default for your convenience.

Adding a Group—Use the command **useradd –g <groupName>** to create a user group.

```
\> useradd –g yyyy
group yyyy has been added.
```

Deleting a Group—To remove a group, use the command **userdel –g <groupName**>.

```
\> userdel –g yyyy
group yyyy has been removed.
```

Adding a User—Use the command **useradd <newUserID>** to add a user for accessing the system. The user's password, by default, is the same as the user name.

```
\> useradd xxxx
user xxxx has been added.
```

In addition, you can permit this user to access a particular service by typing ***-g*** followed by the user group name of the service, i.e., ***useradd –g <groupName> <newUserID>***. For example,

```
\> useradd –g telnetd xxxx
user xxxx is existent
group telnetd is existent
user xxxx has been added to group yyyy
```

Deleting a User—Use the command ***userdel <userID>*** to delete a user from the system. User "admin" **CANNOT** be deleted.

```
\> userdel xxxx
user xxxx has been deleted
```

You can also just remove a user from a user group by using the command ***userdel –g***

<groupName> <newUserID>. For example,

```
\> userdel –g yyyy xxxx
user xxxx has been removed from group yyyy
```

Changing the Password—Please use "System Manager" to change the Password.

Adjusting the Time Zone

Windows CE 6.0 supports Time Zone. You can use **[Control Panel]→[Date/Time]** to adjunct your current Time Zone. It also supports **Daylight Date** and **Daylight Time.**

Adjusting the System Time

Setting the System Time Manually—Use the ***date*** and ***time*** commands to query the current system date and time or to set a new system date and time.

```
\> date
```

```
The current date is: Tuesday, November 22, 2005
Enter the new date (mm-dd-[yy]yy): 12-23-05
\> date /T
Wednesday, November 23, 2005
\> time
The current time is: 5:27:17 PM
Enter the new time (hh:mm:ss): 16:02:00
\> time /T
4:02:04 PM
```

The Date/Time setting is saved to UC-8430-CE RTC so that the date and time will not change when the system reboots.

Starting and Stopping Services

After booting up, the UC-8430-CE computer runs several services continuously to serve requests from users or other programs. Notable services include telnet ("TEL0:"), console ("CON0:"), world wide web HTTP ("HTP0:"), file transfer FTP ("FTP0:"), and others. You will seldom need to use these services. However, note that you can start or stop a service with its associated name by using the "services" command. For example,

Start the FTP service by typing:

```
\> services start FTP0:
```

Stop the FTP service by typing

```
\> services stop FTP0:
```

The default services for the UC-8430-CE are listed as below:

TEL0: Telnet Service
FTP0: FTP Service
CON0: Console Service

Troubleshooting Network Connectivity

The ipconfig tool prints the TCP/IP-related configuration data of a host, including the IP addresses, gateway, and DNS servers.

```
\> ipconfig /all
Windows IP configuration
Ethernet adapter Local Area Connection:
IP Address: 192.168.4.127
Subnet Mask: 255.255.255.0
Adapter Name: IXP425ETHNPE2
Description: IXP425ETHNPE2
Adapter Index: 2
Address: 80 86 33 33 34 12
DHCP Enabled: NO
Ethernet adapter Local Area Connection:
IP Address: 192.168.14.202
Subnet Mask: 255.255.248.0
Default Gateway: 192.168.15.254
Adapter Name: IXP425ETHNPE1
Description: IXP425ETHNPE1
Adapter Index: 3
Address: 78 56 34 91 cc dd
DHCP Enabled: NO
```

```
Host name: UC-8430-CE
Domain Name:
DNS Servers: 192.168.1.6
NODETYPE: 8
Routing Enabled: NO
Proxy Enabled: NO
```

Use the ping command to troubleshoot network connectivity, reachability, and name resolution. The command verifies IP-level connectivity to another TCP/IP computer by sending Internet Control Message Protocol (ICMP) Echo Request messages. The corresponding return Echo Reply messages are displayed, along with round-trip times. For more information, type ping without parameters.

```
\> ping www.moxa.com
Pinging Host www.moxa.com [192.168.1.16]
Reply from 192.168.1.16: Echo size=32 time<1ms TTL=126
Reply from 192.168.1.16: Echo size=32 time<1ms TTL=126
Reply from 192.168.1.16: Echo size=32 time<1ms TTL=126
```

The **route** utility allows you to view or modify network routing tables. Type this command without parameters to view a list of functions.

```
\> route
```

To view current routing items in the tables, type

```
\> route PRINT
```

To add a routing item on network interface 1, type

```
\> route ADD 192.168.0.0 MASK 255.255.0.0 192.168.15.254 IF 2
```

To delete a routing item, type

```
\> route DELETE 192.168.0.0
```

Simple Network Management Protocol (SNMP)

SNMP is the Internet Standard protocol for network management, and is part of the TCP/IP protocol suite. SNMP was developed to monitor and manage networks. It uses a distributed architecture that consists of agents and managers:

SNMP Agent

The SNMP agent is an SNMP application that monitors network traffic and responds to queries from SNMP manager applications. The agent also notifies the manager by sending a trap when significant events occur.

SNMP Manager

An SNMP manager is an SNMP application that generates queries to SNMP-agent applications and receives traps from SNMP-agent applications.

The UC-8430-CE computer installs an SNMP agent to serve as an SNMP device. You should install the SNMP manager on the workstation computer (for example, a Linux system) that monitors the network. After installing the nodes, you need to configure the SNMP manager and agent.

To check SNMP agent capabilities on a target UC-8430-CE (e.g, network IP at 192.168.3.127) computer, log on to the workstation computer that the SNMP manager resides on and then type:

```
\> snmpwalk -v 2c -c public 192.168.3.127 system
SNMPv2-MIB::sysDescr.0 = STRING: Microsoft Windows CE Version 6.0 (Build 0)
```

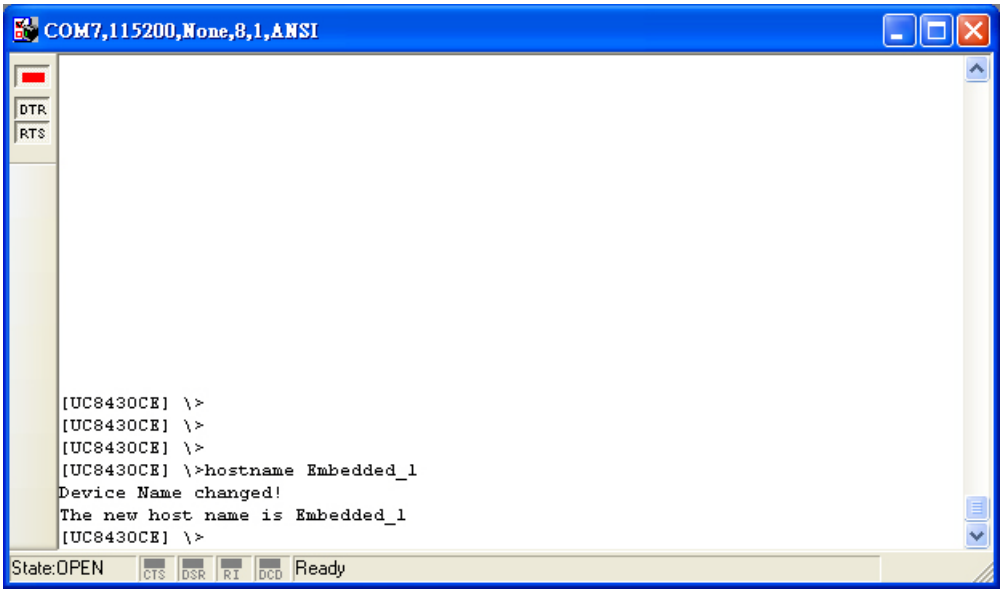
```
SNMPv2-MIB::sysObjectID.0 = OID: SNMPv2-SMI::enterprises.8691.13.8430
DISMAN-EVENT-MIB::sysUpTimeInstance = Timeticks: (586211) 1:37:42.11
SNMPv2-MIB::sysContact.0 = STRING: Your System Contact Here
SNMPv2-MIB::sysName.0 = STRING: UC-8430-CE
SNMPv2-MIB::sysLocation.0 = STRING: Your Location Here
SNMPv2-MIB::sysServices.0 = INTEGER: 72
SNMPv2-MIB::sysORLastChange.0 = Timeticks: (0) 0:00:00.00
SNMPv2-MIB::sysORID.1 = OID: SNMPv2-MIB::snmp
SNMPv2-MIB::sysORID.2 = OID: UDP-MIB::udp
SNMPv2-MIB::sysORID.3 = OID: TCP-MIB::tcp
SNMPv2-MIB::sysORID.4 = OID: IP-MIB::icmp
SNMPv2-MIB::sysORID.5 = OID: IP-MIB::ip
SNMPv2-MIB::sysORID.6 = OID: RFC1213-MIB::at
SNMPv2-MIB::sysORID.7 = OID: IF-MIB::interfaces
SNMPv2-MIB::sysORID.8 = OID: SNMPv2-MIB::system
SNMPv2-MIB::sysORID.9 = OID: HOST-RESOURCES-MIB::host
SNMPv2-MIB::sysORDescr.1 = STRING: Sample SysOR Description ...
SNMPv2-MIB::sysORDescr.2 = STRING: Sample SysOR Description ...
SNMPv2-MIB::sysORDescr.3 = STRING: Sample SysOR Description ...
SNMPv2-MIB::sysORDescr.4 = STRING: Sample SysOR Description ...
SNMPv2-MIB::sysORDescr.5 = STRING: Sample SysOR Description ...
SNMPv2-MIB::sysORDescr.6 = STRING: Sample SysOR Description ...
SNMPv2-MIB::sysORDescr.7 = STRING: Sample SysOR Description ...
SNMPv2-MIB::sysORDescr.8 = STRING: Sample SysOR Description ...
SNMPv2-MIB::sysORDescr.9 = STRING: Sample SysOR Description ...
SNMPv2-MIB::sysORUpTime.1 = Timeticks: (20936) 0:03:29.36
SNMPv2-MIB::sysORUpTime.2 = Timeticks: (20936) 0:03:29.36
SNMPv2-MIB::sysORUpTime.3 = Timeticks: (20936) 0:03:29.36
SNMPv2-MIB::sysORUpTime.4 = Timeticks: (20936) 0:03:29.36
SNMPv2-MIB::sysORUpTime.5 = Timeticks: (20936) 0:03:29.36
SNMPv2-MIB::sysORUpTime.6 = Timeticks: (20936) 0:03:29.36
SNMPv2-MIB::sysORUpTime.7 = Timeticks: (20936) 0:03:29.36
SNMPv2-MIB::sysORUpTime.8 = Timeticks: (20936) 0:03:29.36
SNMPv2-MIB::sysORUpTime.9 = Timeticks: (20940) 0:03:29.40
```

You will see a series of messages from the SNMP agent on the UC-8430-CE computer. From there, you can monitor and manage the computer.

Accessing Files through File Sharing

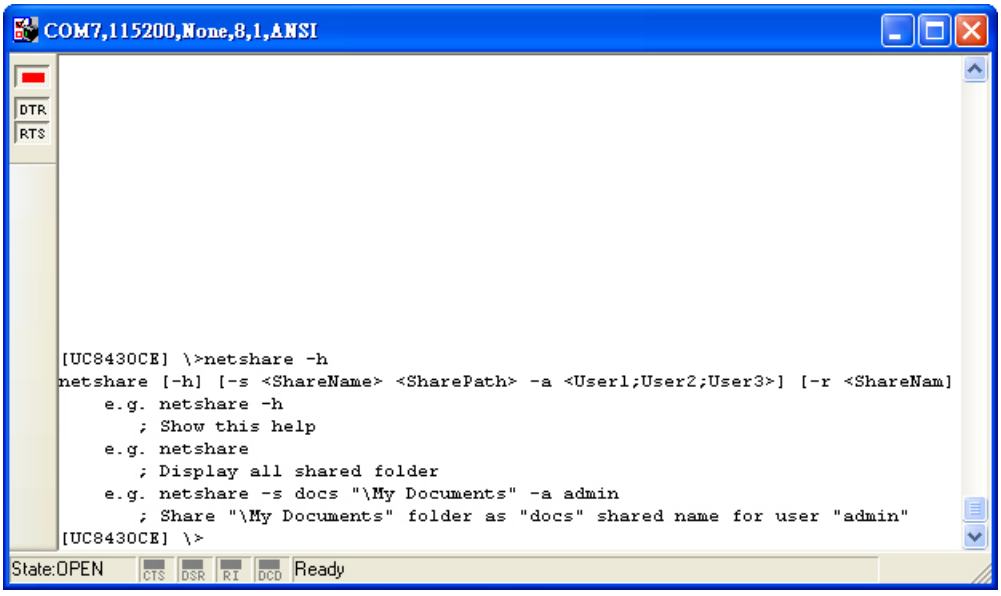
The UC-8430-CE offers file sharing function so that remote computer can access the UC-8430-CE to read the files. Follow the next steps to enable file sharing.

1. To enable file sharing function, you need to rename the hostname of the UC-8430-CE to avoid hostname collision on the network.
   In the Serial Console screen, enter the following command:
   \>hostname Embedded_1



Now you have successfully changed the hostname to Embedded_1. You may use other hostname as you wish.

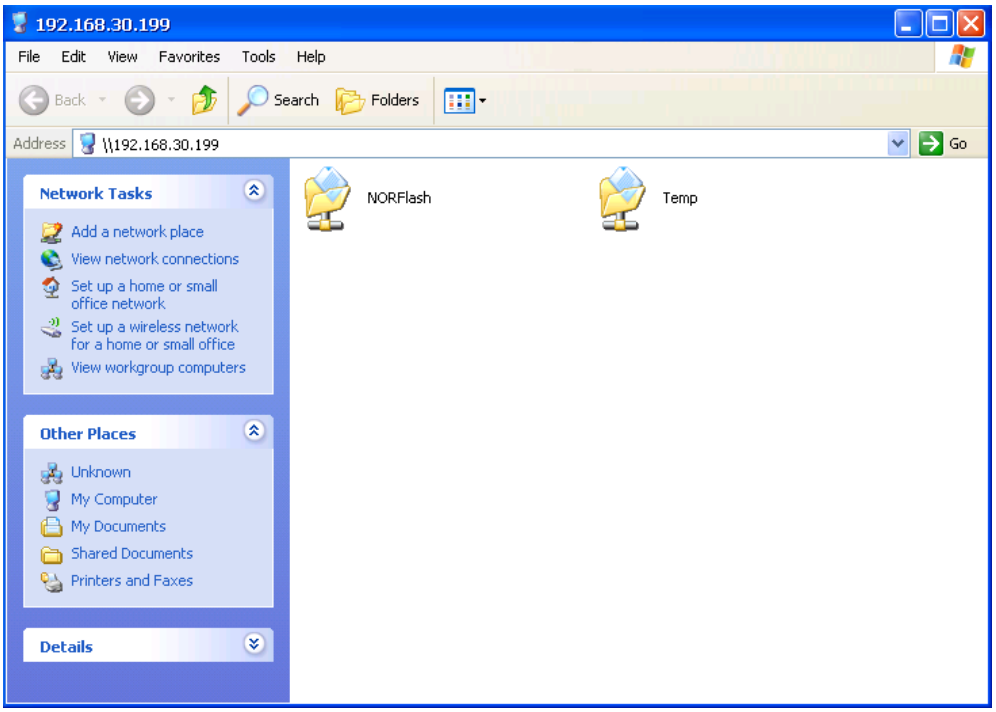
2. Configure the files you would like to share in the UC-8430-CE. Use **\>netshare –h** to configure the parameters. See the following figure.



3. When finished, you may access the UC-8430-CE from the remote computer.
   To use the function, click **Start** → **Run** and then input the device IP (e.g., \\192.168.30.199). The following login window will appear.

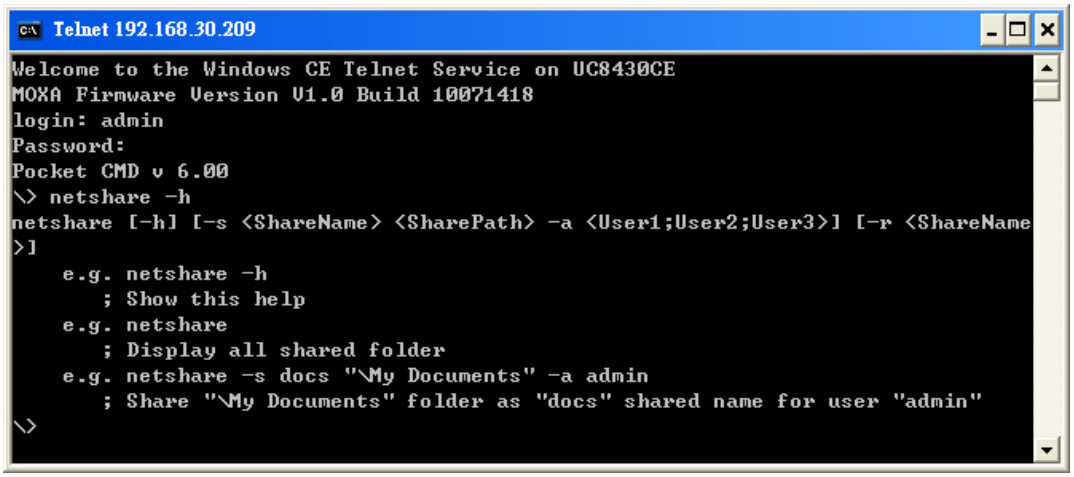
Enter Username and Password to access the UC-8430-CE.

4. When you have successfully logged in the UC-8430-CE, you can view the files in the sharing folders of the UC-8430-CE.



5. A file server function is available for transferring files to the UC-8430-CE efficiently. To use the function, click **Start** → **Run** and then input the device IP (e.g., \\192.168.100.1). The following login window will appear.

6. After logging in, you can view the sharing files on the remote computer.
7. From any command window (telnet or console), type the "netshare -h" command to display the following command syntax:



3

Management Tools

The UC-8430-CE ready-to-run embedded computers are network-centric platforms designed to serve as front-ends for data acquisition and industrial control applications. Due to the distributed characteristics of the devices that these computers control, they are often located in remote locations separate from the system administrator. Managing this kind of remote computer requires handling configuration, file management, and process (thread) monitoring/control over the network.

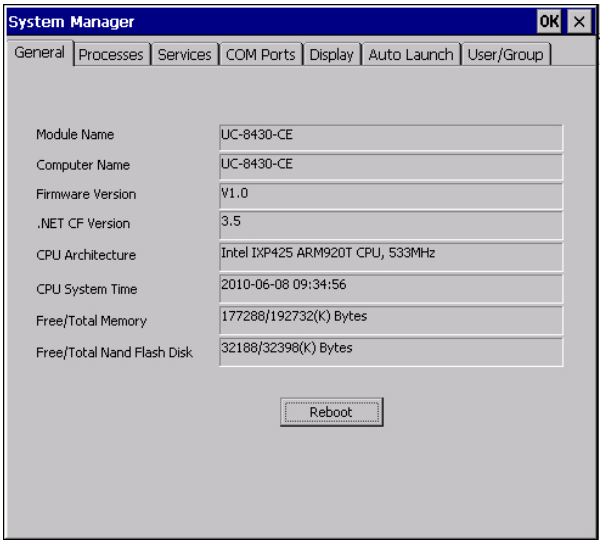
The UC-8430-CE computer comes with a pre-installed management system to assist administrators. Before using the system, make sure that a CRT or LCD monitor is connected to your UC-8430-CE embedded computer, and then double-click the desktop icon [System Manager].

The following topics are covered in this chapter:

- **System Information**
- **Serial Port Configuration**
- **Process (Thread) Monitoring/Control**
- **Services Monitoring/Control**
- **Display**
- **User/Group Management**
- **Auto Launch Configuration**
- **Web Server Configuration**

System Information

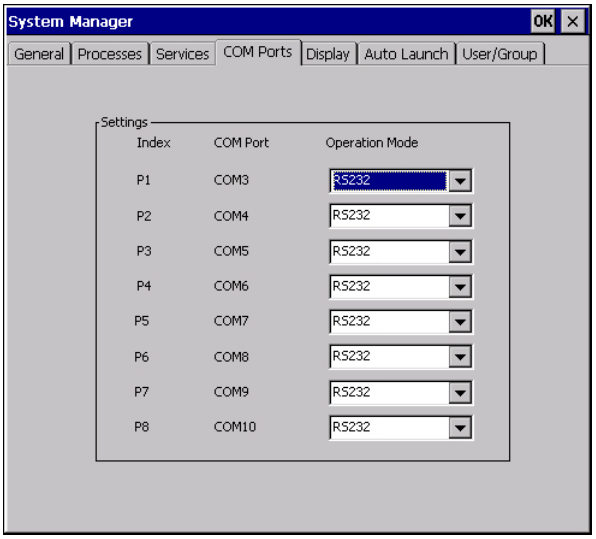
The first page displays the system information of the UC-8430-CE computer, including the firmware version of the computer, .Net CF version, the system time, and system resources, including main memory and file system usage.



Serial Port Configuration

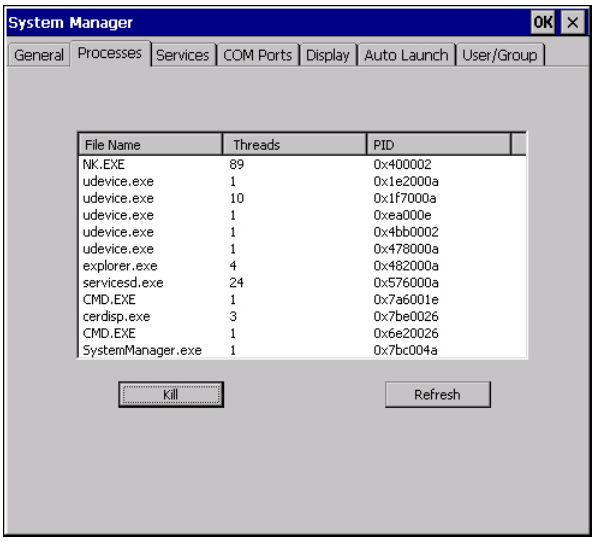
The UC-8430-CE has 8 high-performance serial ports. When the system starts, specify the default operation mode (RS-232, RS-422, or RS-485). The factory default mode is RS-232.

Click the **COM Ports** tab to see the status of the 4 ports.



Process (Thread) Monitoring/Control

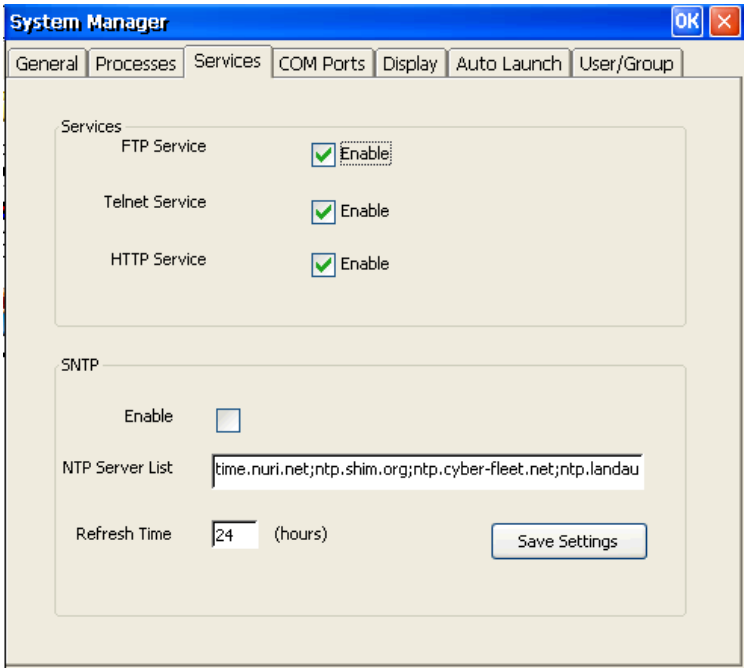
While running, the UC-8430-CE computer manages up to 32,000 applications. To view processes that are currently running, click the **Processes** tab. To kill a process, click the **kill** button next to the process name.



Services Monitoring/Control

Some services, such as FTP, Telnet and HTTP, run in the background to provide service for user requests.

Click the appropriate check box to enable or disable operation of a particular service.

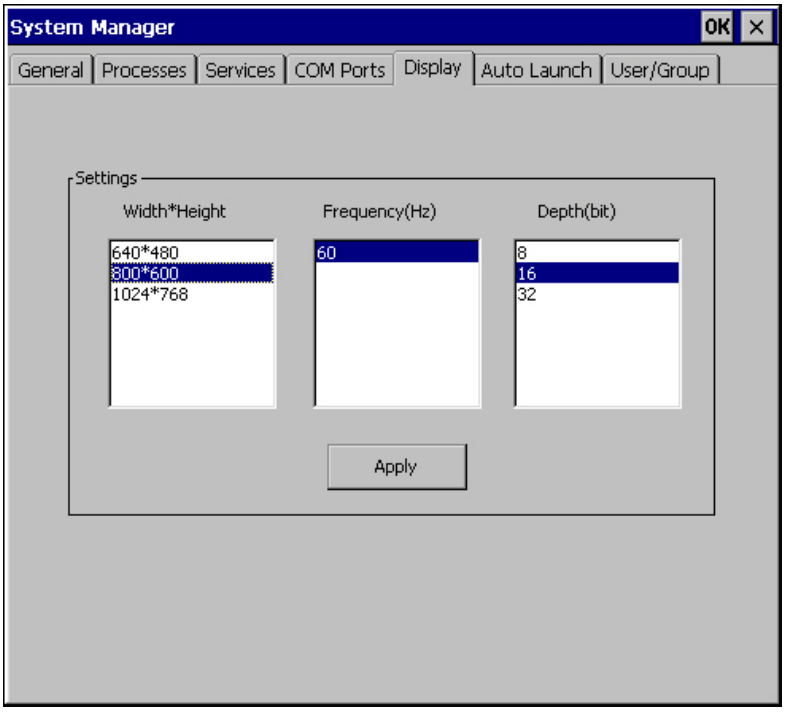


You can also use SNTP to adjust the time automatically. To do this, check mark the **Enable** check box under SNTP, and then click **Save Settings**.

To maintain normal operation of the computer, some listed services cannot be stopped. Such services do not have a check box next to them.

Display

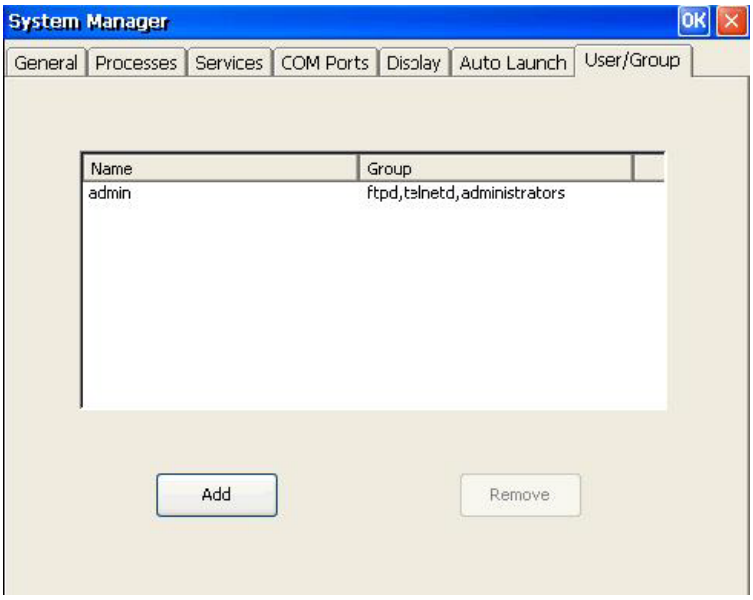
The UC-8430-CE's VGA output uses a DB15 female CRT connector to display the Windows CE desktop on an LCD monitor or a CRT monitor. The default settings, which are shown on the **Display** tab, are **800*600** for Width*Height, **60** (in Hz) for Frequency, and **16** (bits) for Depth. For general use, adjust the settings to match the specifications of your LCD or CRT. Click **Apply** to save the setting.



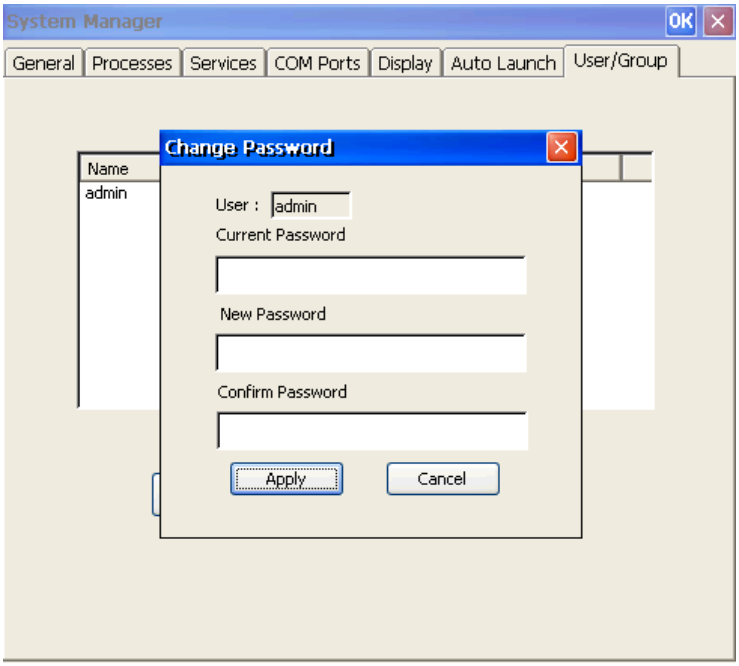
Note: You must reboot your UC-8430-CE for new settings to take effect.

User/Group Management

Use the **Add** button on the **User/Group** tab to assign specific services (such as ftp and telnet) to individual users and user groups. Use the **Remove** button to remove users.

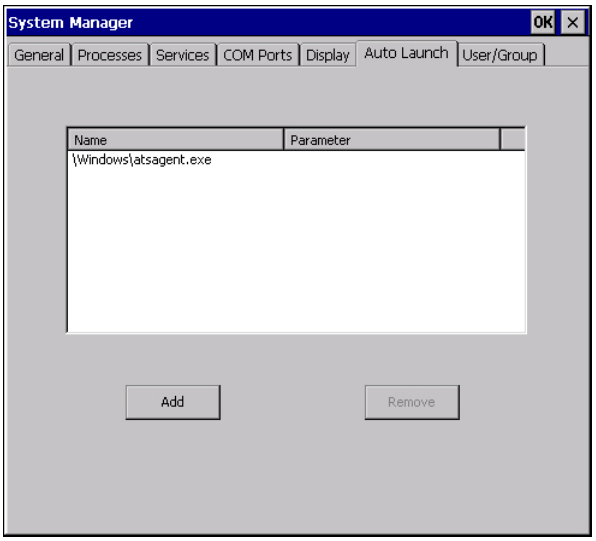


Use the **Change Password** utility to change the password.



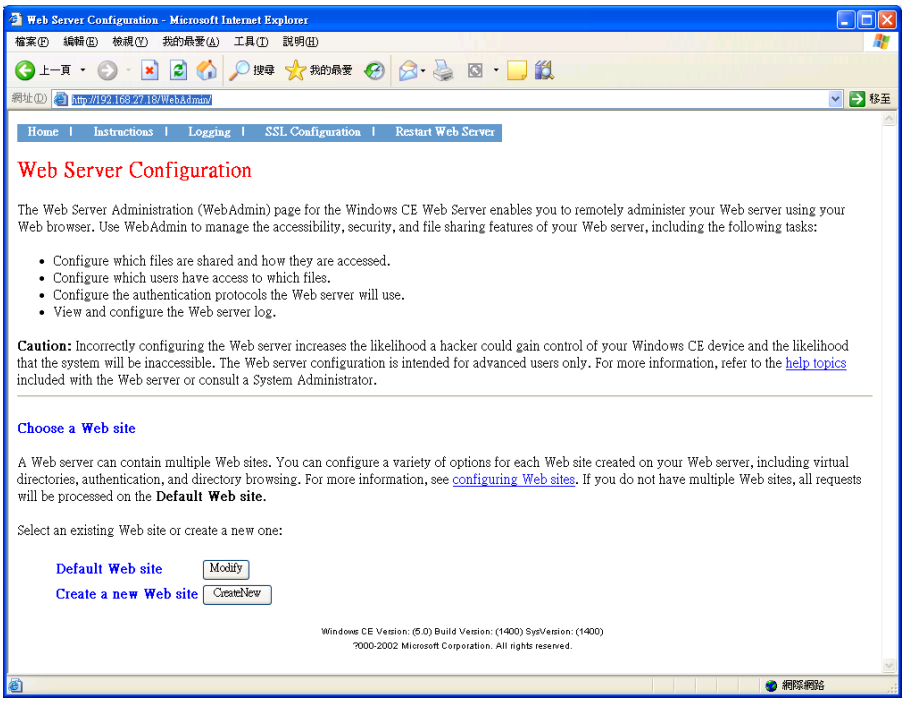
Auto Launch Configuration

Use the **Auto Launch** tab to specify which programs will execute automatically on boot up. Click the **Add** button to add programs to the list, and then restart the UC-8430-CE.

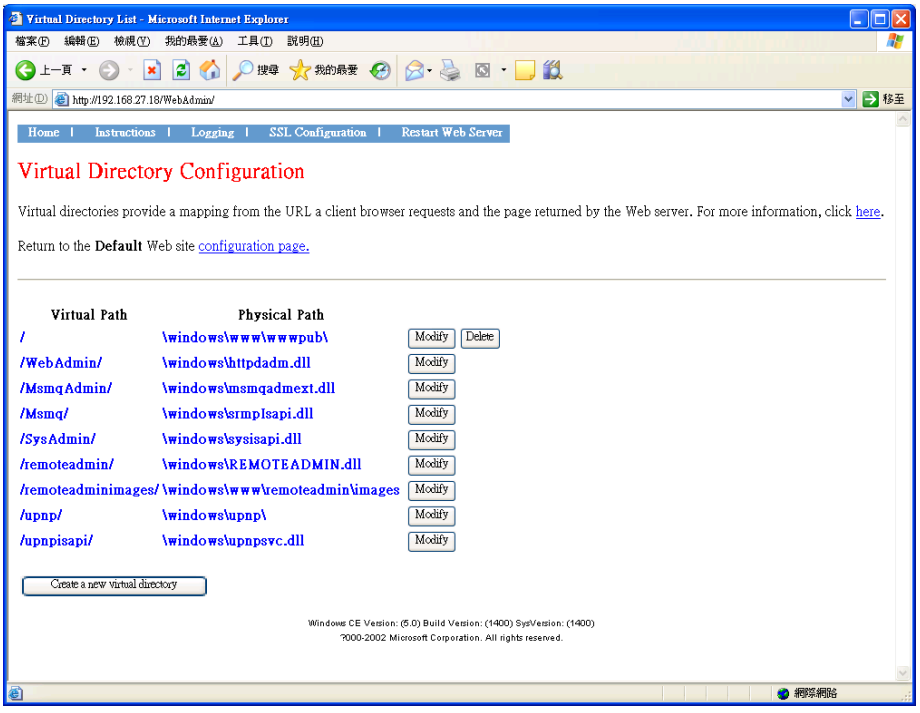


Web Server Configuration

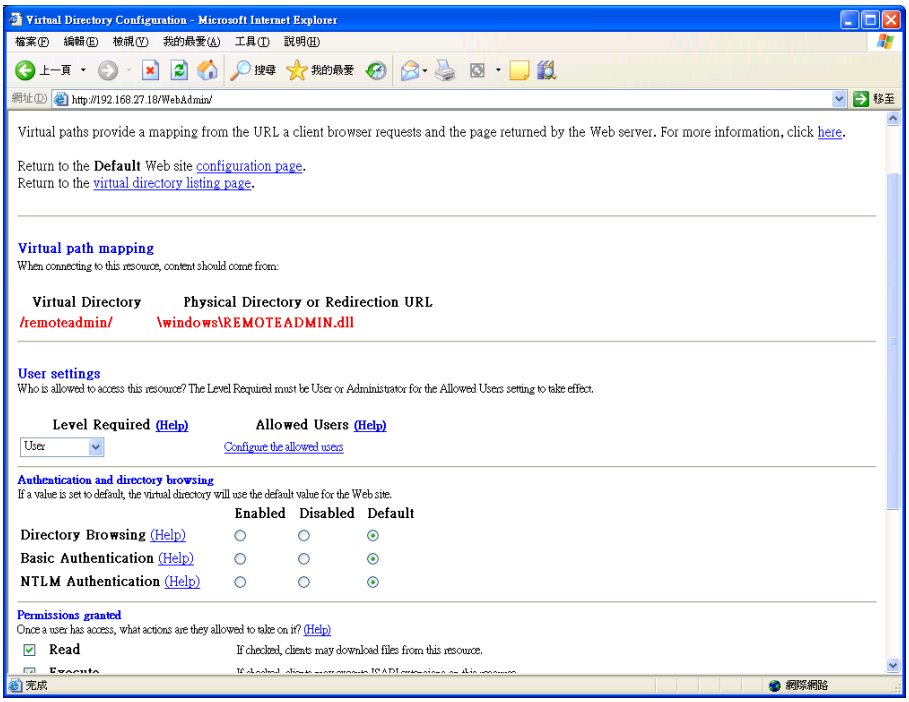
You will need to use a Windows 2000 or Windows XP machine for web administration. Open Internet Explorer and then type the URL http://192.168.3.127/WebAdmin (replace the IP with your UC-8430-CE's network IP address) to link to the **Web Server Configuration** page.


Web Server Configuration - Microsoft Internet Explorer
Home | Instructions | Logging | SSL Configuration | Restart Web Server
Web Server Configuration
The Web Server Administration (WebAdmin) page for the Windows CE Web Server enables you to remotely administer your Web server using your Web browser. Use WebAdmin to manage the accessibility, security, and file sharing features of your Web server, including the following tasks:
Configure which files are shared and how they are accessed.
Configure which users have access to which files.
Configure the authentication protocols the Web server will use.
View and configure the Web server log.
Caution: Incorrectly configuring the Web server increases the likelihood a hacker could gain control of your Windows CE device and the likelihood that the system will be inaccessible. The Web server configuration is intended for advanced users only. For more information, refer to the help topics included with the Web server or consult a System Administrator.
Choose a Web site
A Web server can contain multiple Web sites. You can configure a variety of options for each Web site created on your Web server, including virtual directories, authentication, and directory browsing. For more information, see configuring Web sites. If you do not have multiple Web sites, all requests will be processed on the Default Web site.
Select an existing Web site or create a new one:
Default Web site
Modify
Create a new Web site
CreateNew
Windows CE Version: (5.0) Build Version: (1400) SysVersion: (1400)
?2000-2002 Microsoft Corporation. All rights reserved.

You can now create a new web site or create a virtual web path for your web application.


Virtual Directory List - Microsoft Internet Explorer
Home | Instructions | Logging | SSL Configuration | Restart Web Server
Virtual Directory Configuration
Virtual directories provide a mapping from the URL a client browser requests and the page returned by the Web server. For more information, click here.
Return to the Default Web site configuration page.
Virtual Path
Physical Path
/ \windows\www\wwwpub\ Modify Delete
/WebAdmin/ \windows\httpdadm.dll Modify
/MsmqAdmin/ \windows\msmqadmext.dll Modify
/Msmq/ \windows\srmpIsapi.dll Modify
/SysAdmin/ \windows\sysisapi.dll Modify
/remoteadmin/ \windows\REMOTEADMIN.dll Modify
/remoteadminimages/ \windows\www\remoteadmin\images Modify
/upnp/ \windows\upnp\ Modify
/upnpisapi/ \windows\upnpsvc.dll Modify
Create a new virtual directory
Windows CE Version: (5.0) Build Version: (1400) SysVersion: (1400)
?2000-2002 Microsoft Corporation. All rights reserved.

You can also change the authentication for each web virtual directory.


Virtual Directory Configuration - Microsoft Internet Explorer
檔案(F) 編輯(E) 檢視(V) 我的最愛(A) 工具(T) 說明(H)
上一頁 搜尋 我的最愛
網址(D) http://192.168.27.18/WebAdmin/
移至
Virtual paths provide a mapping from the URL a client browser requests and the page returned by the Web server. For more information, click here.
Return to the Default Web site configuration page.
Return to the virtual directory listing page.
Virtual path mapping
When connecting to this resource, content should come from:
Virtual Directory
Physical Directory or Redirection URL
/remoteadmin/
\windows\REMOTEADMIN.dll
User settings
Who is allowed to access this resource? The Level Required must be User or Administrator for the Allowed Users setting to take effect.
Level Required (Help)
Allowed Users (Help)
User
Configure the allowed users
Authentication and directory browsing
If a value is set to default, the virtual directory will use the default value for the Web site.
Enabled
Disabled
Default
Directory Browsing (Help)
Basic Authentication (Help)
NTLM Authentication (Help)
Permissions granted
Once a user has access, what actions are they allowed to take on it? (Help)
Read
If checked, clients may download files from this resource.
完成
網際網路

4

Web-based Management System

Note: Internet Explorer 5.5 and above is required to use the web based management system.

The UC-8430-CE ready-to-run embedded computers are network-centric platforms and are designed to serve as excellent front-ends for data acquisition and industrial control. Due to the distributed characteristics of the devices, that these computers control, they often reside in harsh areas as the devices themselves and are away from system administrators. To manage these computers, operations such as networking/server configuration, file management, and process (thread) monitoring/control become a critical area to consider.

To resolve these management issues and accordingly reduce the toil of system administration, a web-based management system is installed into the UC-8430-CE computer. This system incorporates often-used features into CGI pages and categorizes them on a menu bar.

Before operating the system, please make sure you have a network connection from your PC to the target computer and can open an Internet browser at your PC after the connection. Then, use the IP address of the target computer as a home page URL. After the main page comes out, click on **Web-Based Management.**

Provide your authentication data including user ID and password into the corresponding fields of the prompt (case sensitive) and then hit the enter key to request access to the management system. The system checks your data with the users previously defined in the computer and then determines the validity of your logon.

The default User ID and Password are as follows:

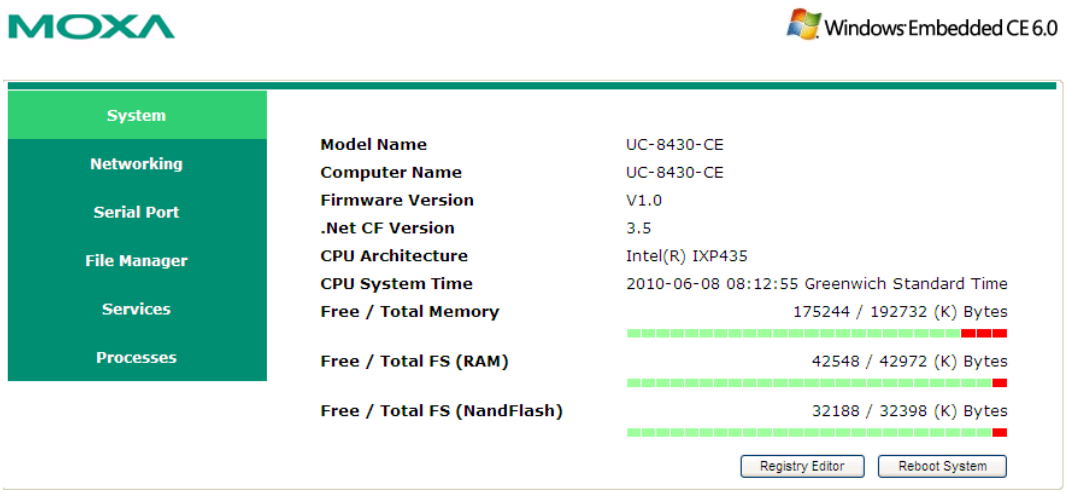
User ID: admin
Password: admin

The following topics are covered in this chapter:

- **System Information**
- **Networking/Server Configuration**
- **Serial Port Configuration**
- **Process (Thread) Monitoring/Control**
- **Launching Processes Automatically**
- **Services Monitoring/Control**
- **Binary/Text File Management**

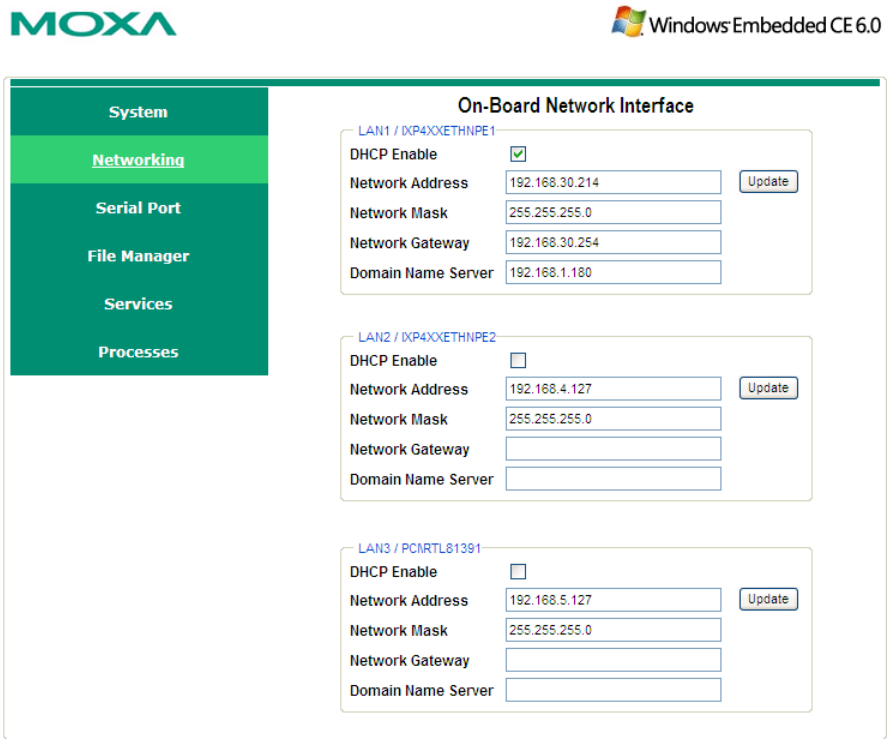
System Information

After you logon successfully, the main page displays the system information of the target UC-8430-CE computer, including the firmware version of the computer, the RTC time, the CPU system time, and system resources including main memory and file system usage (RAM and Flash).



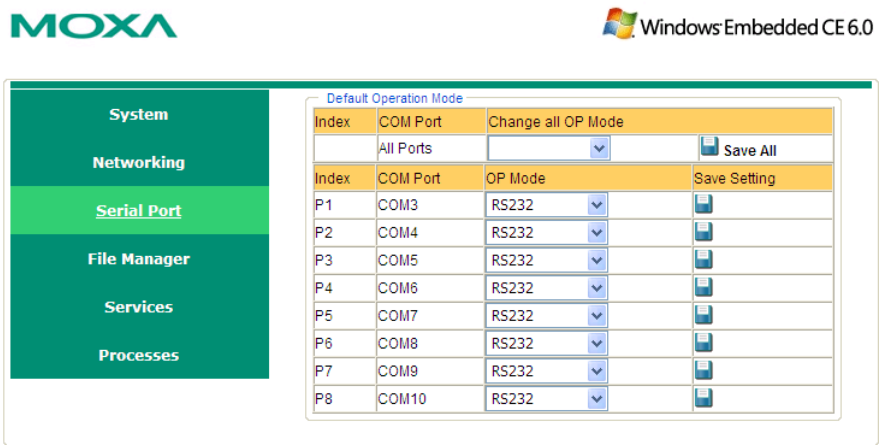
Networking/Server Configuration

The UC-8430-CE computer has 3 embedded network interfaces. To view or change their settings, click the ***Networking*** item on the menu bar. After the page loads, enter the relevant details on the corresponding text fields and then click "Update" to make the changes effective for the interfaces.



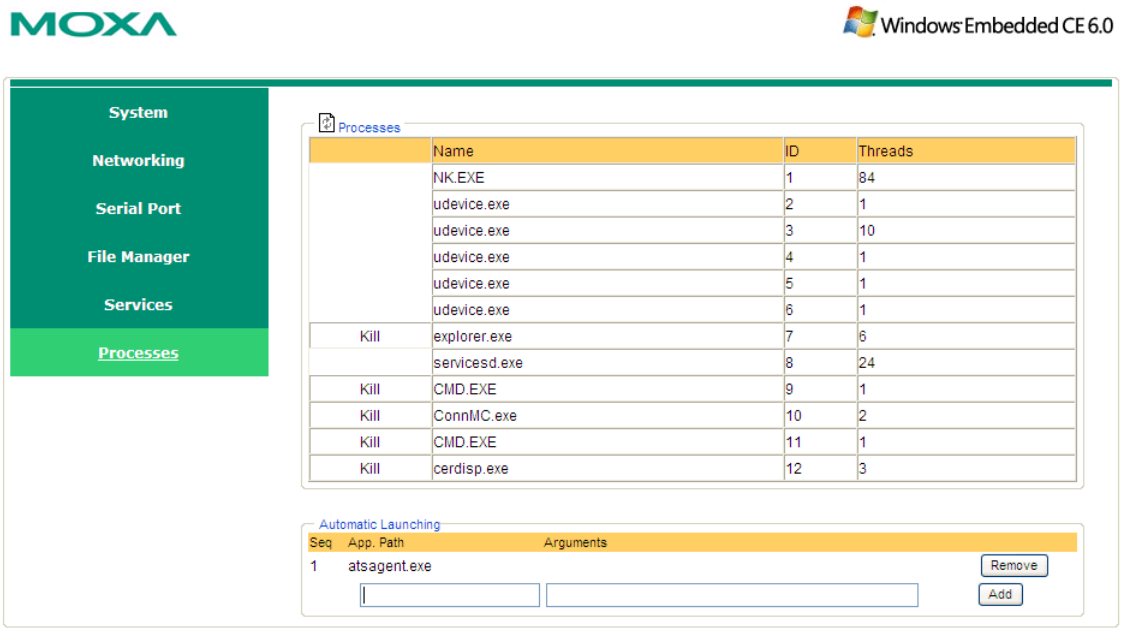
Serial Port Configuration

The UC-8430-CE contains 8 x MU860 high-performance serial ports. When the system starts up you can specify the default operation mode (RS-232, RS-422 or RS-485). The default mode would be RS-232.



Process (Thread) Monitoring/Control

At runtime, the UC-8430-CE computer manages up to 32 applications. You can use the management system to monitor and control them. To view current processes, please click the Processes item on the main menu bar. The running processes are then displayed. You can kill a process by clicking the "kill" button next to the process name.



Launching Processes Automatically

To have your application start on boot, do the following:

Step 1: Click the "Processes" item on the main menu bar. At the lower part of the page, there is an area marked as "Automatic Launching".

Step 2: Fill in the full path of the application in the first text field and its arguments in a separate text field if there are any.

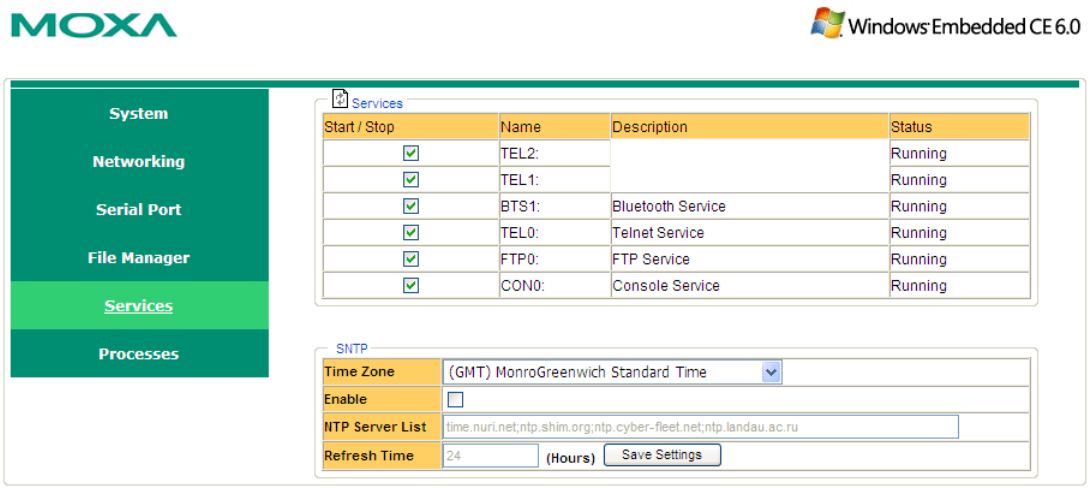
Step 3: Click "Add".

Services Monitoring/Control

Some services run on the background to provide services, such as ftp, telnet and etc, for user requests. To monitor and control these services, do the following:

Step 1: Click the "Services" item on the main menu bar. The running services are displayed.

Step 2: Click on a check box to toggle a start/stop operation for a service.

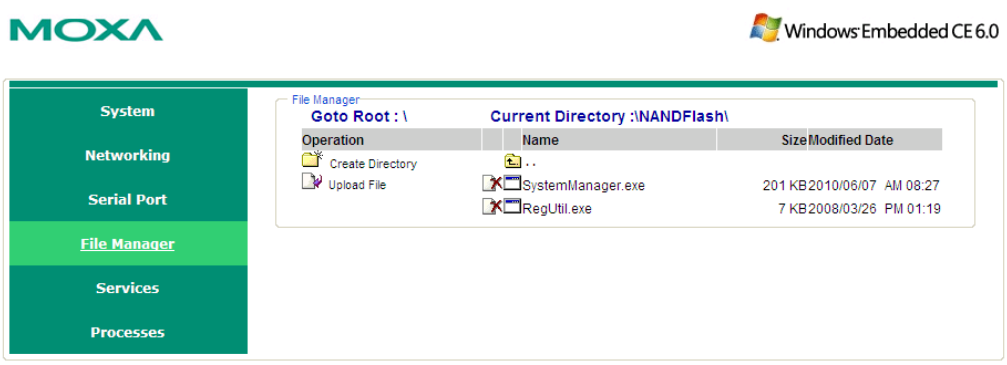


Some listed services cannot be stopped in order to maintain normal operation of the computer. Such services do not have a check box next to them.

Binary/Text File Management

On a PC, it is certainly convenient to have a friendly window-based file manager to browse, delete, and organize files and directories. On the UC-8430-CE computer, such a convenient feature is simulated by the web-based management system. Just click "File Manager" to view the directory tree of your target UC-8430-CE computer. Using the File manager, you can perform the following operations:

- To browse a child directory, click the name of the directory.
- To delete a file, click the icon with an X in front of the file icon.
- To create a child directory, click Create Directory and then follow the instructions.
- To refresh the current directory, click Current Directory at the top of the page.



In addition, the management system offers a mechanism for file upload. This mechanism helps you transfer files from your workstation to the target computer in an easy way. For instance, after you have built an application on the development workstation, you can use this mechanism to upload the application to the current directory of the target computer.

Step 1: Click "Upload File". A browser window pops up.

Step 2: From the pop-up browser window, click "Browse" to bring up a local file manager.

Step 3: Browse to and select the file that you want to upload and click "open".

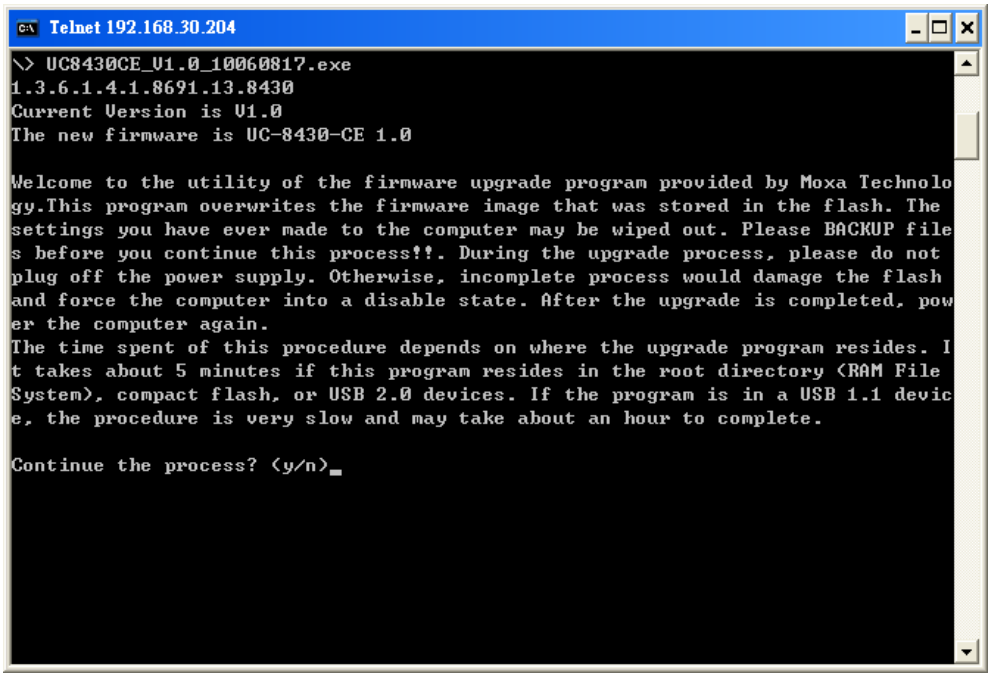
Step 4: Navigate back to the "File Upload" browser window, and click "OK". The file uploading will start.

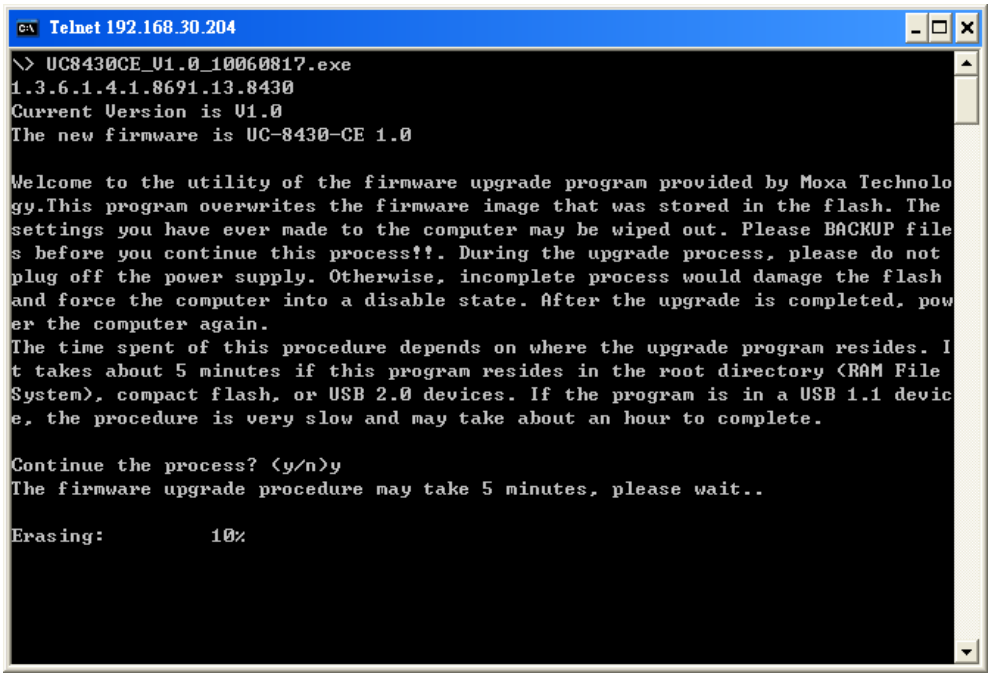
Step 5: After the file is uploaded completely, refresh the page.

A

Firmware Upgrade Procedure

MOXA engineers continuously enhance and develop software features to improve the quality and functionalities of the embedded products. New firmware will be continuously produced and posted in the MOXA download center. When you decide to replace your firmware with a new one, follow the steps below. Go to MOXA download center to download an executable file for your computer, for example UC8430CE_V1.0_10071418.exe. Upload this file to the target machine under the root directory (i.e., \). If you place this file in a compact flash or a USB device, we suggest you to copy it to the root directory for a faster upgrade operation. Logon the target computer via a telnet or console connection. Execute this file. Press "y" to continue the process.


Telnet 192.168.30.204
\> UC8430CE_V1.0_10060817.exe
1.3.6.1.4.1.8691.13.8430
Current Version is V1.0
The new firmware is UC-8430-CE 1.0
Welcome to the utility of the firmware upgrade program provided by Moxa Technology.This program overwrites the firmware image that was stored in the flash. The settings you have ever made to the computer may be wiped out. Please BACKUP files before you continue this process!!. During the upgrade process, please do not plug off the power supply. Otherwise, incomplete process would damage the flash and force the computer into a disable state. After the upgrade is completed, power the computer again.
The time spent of this procedure depends on where the upgrade program resides. It takes about 5 minutes if this program resides in the root directory (RAM File System), compact flash, or USB 2.0 devices. If the program is in a USB 1.1 device, the procedure is very slow and may take about an hour to complete.
Continue the process? (y/n)


Telnet 192.168.30.204
\> UC8430CE_V1.0_10060817.exe
1.3.6.1.4.1.8691.13.8430
Current Version is V1.0
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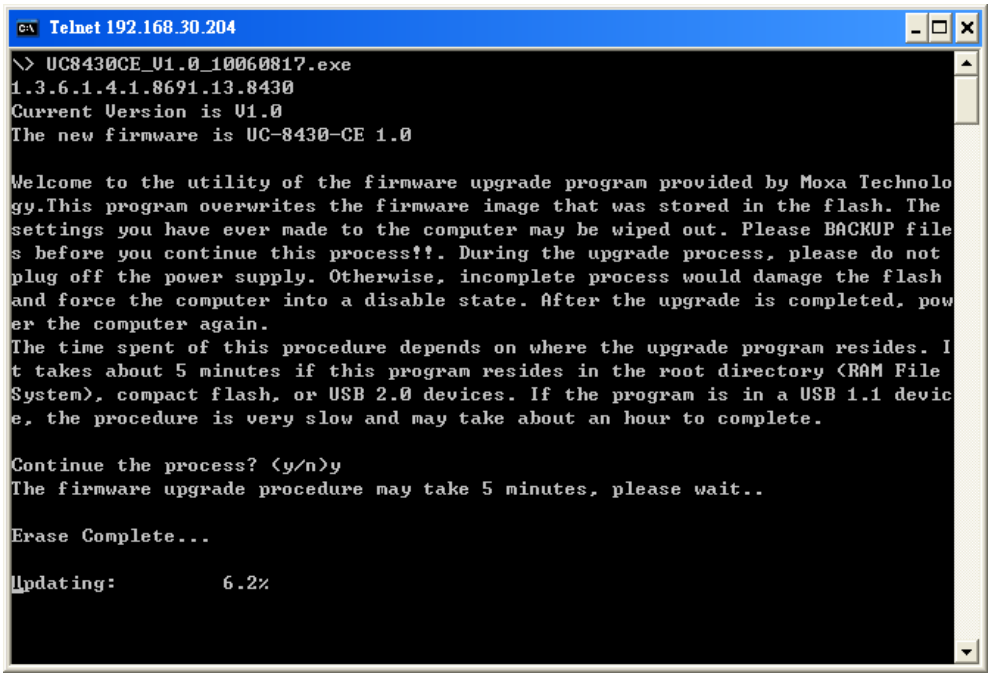
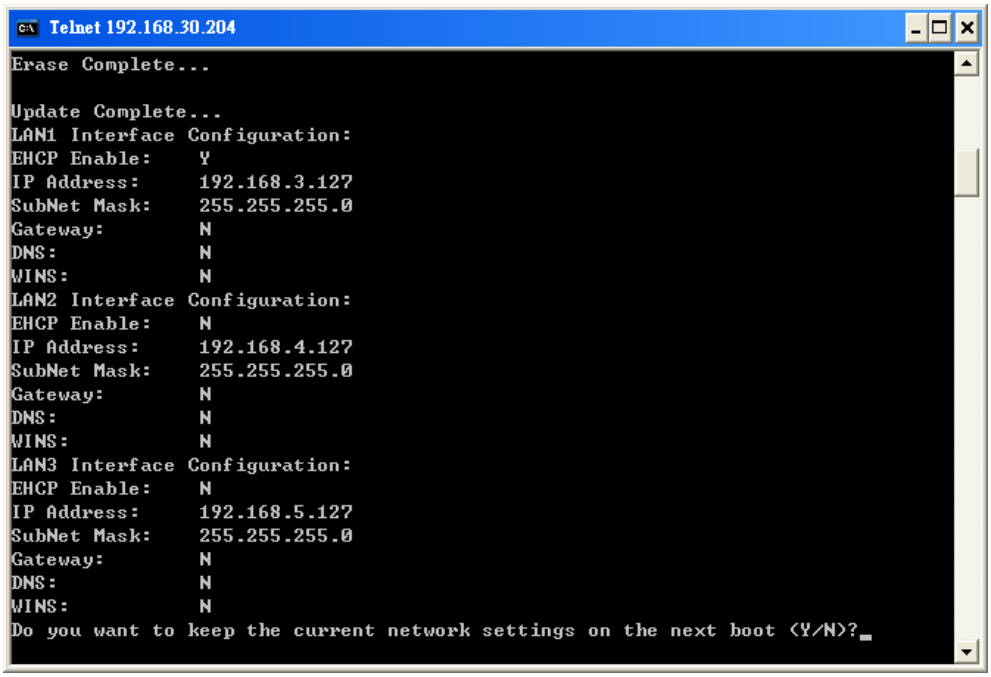
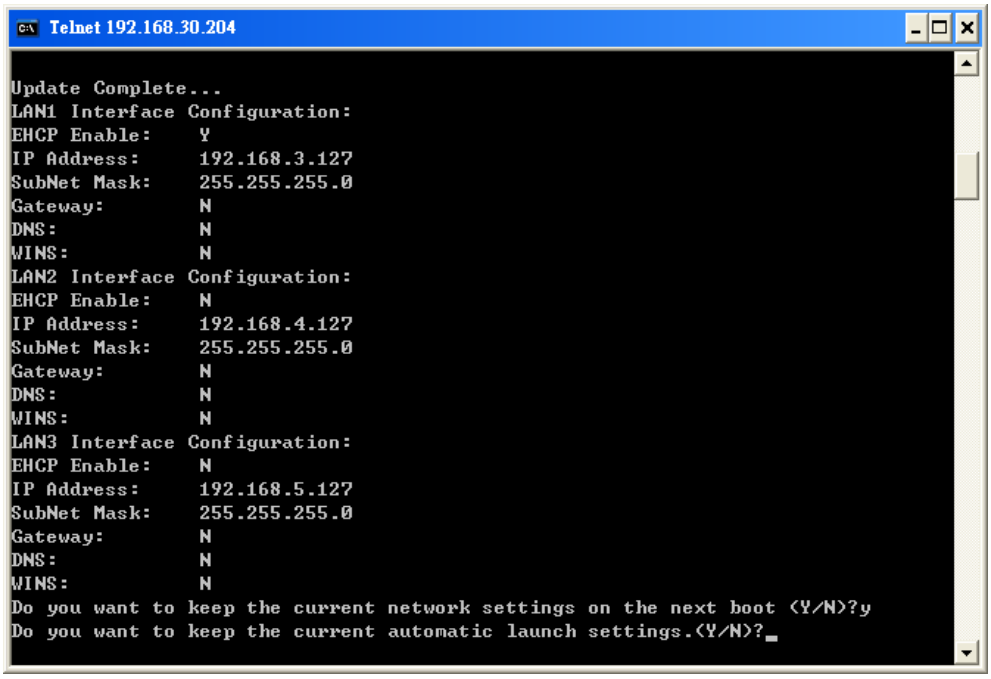
The time spent of this procedure depends on where the upgrade program resides. It takes about 5 minutes if this program resides in the root directory (RAM File System), compact flash, or USB 2.0 devices. If the program is in a USB 1.1 device, the procedure is very slow and may take about an hour to complete.
Continue the process? (y/n)y
The firmware upgrade procedure may take 5 minutes, please wait..
Erasing: 10%


Telnet 192.168.30.204
\> UC8430CE_V1.0_10060817.exe
1.3.6.1.4.1.8691.13.8430
Current Version is V1.0
The new firmware is UC-8430-CE 1.0
Welcome to the utility of the firmware upgrade program provided by Moxa Technology.This program overwrites the firmware image that was stored in the flash. The settings you have ever made to the computer may be wiped out. Please BACKUP files before you continue this process!!. During the upgrade process, please do not plug off the power supply. Otherwise, incomplete process would damage the flash and force the computer into a disable state. After the upgrade is completed, power the computer again.
The time spent of this procedure depends on where the upgrade program resides. It takes about 5 minutes if this program resides in the root directory (RAM File System), compact flash, or USB 2.0 devices. If the program is in a USB 1.1 device, the procedure is very slow and may take about an hour to complete.
Continue the process? (y/n)y
The firmware upgrade procedure may take 5 minutes, please wait..
Erase Complete...
Updating: 6.2%

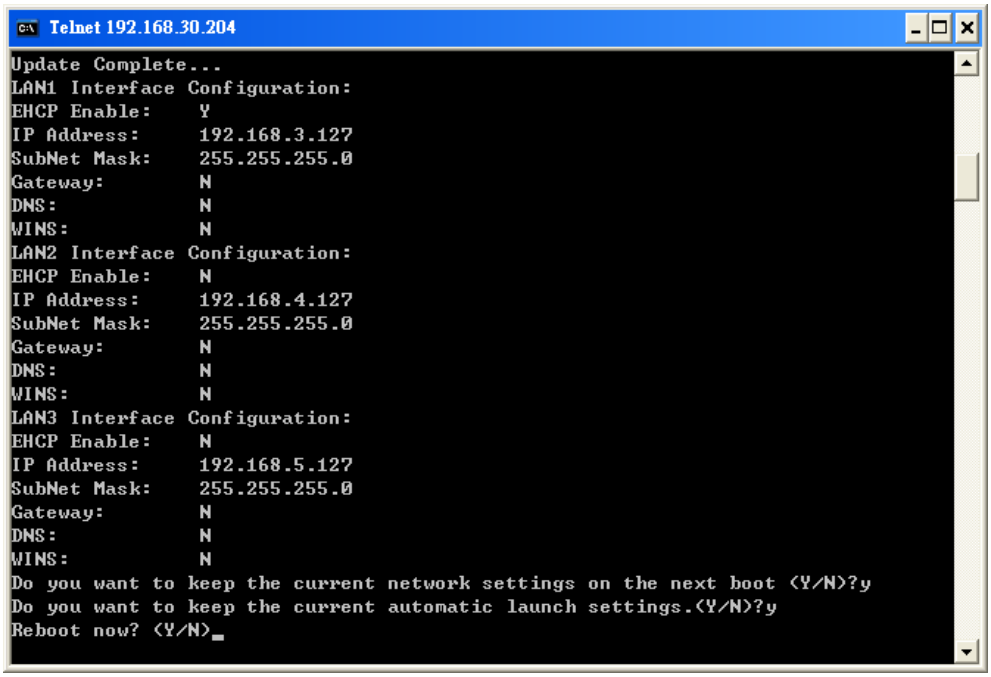
1. Wait for the upgrade to complete; it will take about 5 minutes to finish it. After upgrading, select if you would like to keep the current network settings or restore the factory default values. Press "Y" to keep the current network settings.



2. Press "Y" to keep the current automatic launch settings.



3. Press "Y" to reboot the target UC-8430-CE.



After system restart, you will find the new firmware ready and running.

B

Application Development

To let user's programs work with the device easily and quickly. The "mxdev" library on C++ and the "mxdevice" library on C Sharp is provided to help users develop their application on UC-8430-CE device. The complete source code can be found in the example directory in software CD.

The following topics are covered in this appendix:

- **UC-8430-CE SDK and Library**
  - Install SDK
  - Developing an application with VS2005
  - Visual C++ Library
  - Visual C++ Examples
  - Net Compact Framework Library
  - Visual C# Examples

UC-8430-CE SDK and Library

Install SDK

UC-8430-CE provides a programming library for simplify your development time.

Before using the Library SDK, you must install the MOXA UC-8430-CE SDK (UC-8430-CE.msi). The SDK file is in the "sdk" directory of UC-8430-CE Software CD. The following steps are the SDK installation guide.

- Copy UC-8430-CE.msi to your development PC (Windows XP/Vista)
- Double click the **UC-8430-CE.msi.**
- Follow the wizard prompt to complete the installation steps.

Developing an application with VS2005

- Open Microsoft® Visual Studio .Net 2005.
- From the File menu, choose New Project.
- Choose the Project Type and then select the Smart Device Application as the type of project.
- Fill in the project name and click OK.
- Choose Windows CE as the target platform.
- Select the desired project type and click OK.
- Write your application code.
- From the toolbar, choose the Device SDK UC-8430-CE.
- From the Build menu, choose Build Project or Rebuild Project.
- When you complete your application, upload it to the embedded computer.
- Log on to the embedded computer. At the console prompt, execute it directly if it is a C++ or C# file

Visual C++ Library

After the SDK is installed on your development PC, the library can be found in your Visual Studio 2005/2008 environment.

UART

This function opens a serial port.

unsigned int mxsp_open(int port);
Inputs: <port> Port number (starting from 3).
Return Values: When successful, this function returns the handle of the open port. When an error occurs, it returns a negative value.
Remark: For example, uses mxsp_open(3) to retrieve the interface of COM3: The function is equivalent Win32 CreateFile() API.

This function closes a serial port.

int mxsp_close(unsigned int fd);
Inputs: <fd>Handle of the open port.
Return Values: When successful, this function returns 0. When an error occurs, it returns a negative value.
Remark:

The function is equivalent Win32 CloseHandle() API.
This function sets the type of communication interface for a serial port.
int mxsp_set_interface(unsigned int fd, int mode);
Inputs: <fd>Handle of the open port. <mode> 0: RS232, 1: RS485_2WIRE, 2: RS422, 3: RS485_4WIRE
Return Values: When successful, this function returns 0.
Remark:

This function gets the type of communication interface of a serial port.

int mxsp_get_interface(unsigned int fd);
Inputs: <fd>Handle of the open port.
Return Values: When successful, this function returns one of the values from 0 to 3. The function returns a negative value when an error occurs.
Remark:

DIO

This function opens an access to the DIO device.

HANDLE mxdgio_open(void);
Inputs: None
Return Values: When successful, this function returns an access to the DIO device. Otherwise, there is an error.
Remark:

This function closes the access to the DIO device.

void mxdgio_close(HANDLE fd);
Inputs: <fd> The access to the device.
Return Values: none
Remark:

This function gets the signal state of a digital input channel.

int mxdgio_get_input_signal(HANDLE fd, int port);
Inputs: <fd> The access to the device. <port> the port index, from 0 to 3 mapping to DI0~DI3
Return Values: Returns 1 for a high signal or 0 for a low signal, if successful. Otherwise, it returns a value of -1.
Remark:

This function gets the signal state of a digital output channel.

int mxdgio_get_output_signal(HANDLE fd, int port);
Inputs: <fd> The access to the device. <port> the port index, from 0 to 3 mapping to DO0~DO3
Return Values: Returns 1 for a high signal or 0 for a low signal, if successful. Otherwise, it returns a value of -1.
Remark:

This function sets a high signal to a digital output channel.

int mxdgio_set_output_signal_high(HANDLE fd, int port);
Inputs: <fd> The access to the device. <port> the port index, from 0 to 3 mapping to DO0~DO3
Return Values: When successful, this function returns 0. When an error occurs, it returns -1.
Remark:

This function sets a low signal to a digital output.

int mxdgio_set_output_signal_low(HANDLE fd, int port);
Inputs: <fd> The access to the device. <port> the port index, from 0 to 3 mapping to DO0~DO3
Return Values: When successful, this function returns 0. When an error occurs, it returns -1.
Remark:

Watchdog

This function starts a watchdog timer.

int mxwdg_open(unsigned long time);
Inputs: <time> Specifies an exact time period in milliseconds. Note that the watchdog timer needs to be refreshed to avoid reset.
Return Values: When successful, this function returns a positive value representing a file descriptor. Otherwise, it returns a negative value.
Remark: After calling the mxwdg_open (), you must call mxwdg_refresh () in the specified time<time> or the system will be triggered rebooting.

This function refreshes the watchdog timer, and should be called periodically during timer timeouts.

int mxwdg_refresh(int fd);
Inputs: <fd> Specifies the file descriptor of the watchdog timer.
Return Values: When successful, this function returns 0. Otherwise, it returns a negative value.
Remark:

This function stops the watchdog timer.

void mxwdg_close(int fd);
Inputs: <fd> Specifies the file descriptor of the watchdog timer.
Return Values: none
Remark:

Buzzer

This function opens a handle that operates the buzzer.

HANDLE mxbuzzer_open(void);
Inputs: none
Return Values: When successful, this function returns a positive value (or handle) that represents the buzzer device.
Remark:

This function regulates the buzzer.

void mxbuzzer_beep(HANDLE fd, int time);
Inputs: <fd> Specifies the open handle of the buzzer. <time> Specifies the amount of time (in milliseconds) that the beep lasts.
Return Values: none
Remark:

This function closes the open handle of the buzzer.

void mxbuzzer_close(HANDLE fd);
Inputs: <fd> Specifies the open handle of the buzzer.
Return Values: none
Remark:

Visual C++ Examples

In the software CD, you can get the C++ examples for your reference.

Net Compact Framework Library

For .Net programming, MOXA also provides .Net Compact Framework library.

UART

set the interface of UART.

Class Name: SerialInterface

Method: void SetComPortInterface(string port, SerialMode mode);
Inputs: <port> serial port name string, e.g. COM3:, COM4:, $device\COM12 <mode> the interface number of serial port
Return Values: none

Remark:
public enum SerialMode : byte
{
RS232_MODE = 0x0,
RS485_2WIRE_MODE = 0x1,
RS422_MODE = 0x2,
RS485_4WIRE_MODE = 0x3
}

DIO

Open the DIO

Class Name: DIO

Method: bool Open();
Inputs: <port> the port index, from 0 to 3 mapping to DO0~DO3 <data> 1 : HIGH, 0 : LOW
Return Values: true on success, false, the function fails
Remark:

Close the DIO

Class Name: DIO

Method: void Close();
Inputs: <port> the port index, from 0 to 3 mapping to DI0~DI3
Return Values: 1 indicates HIGH, 0 indicates LOW
Remark:

get the DI value

Class Name: DIO

Method: int GetInputSignal(int port);
Inputs: <port> the port index, from 0 to 3 mapping to DI0~DI3
Return Values: 1 indicates HIGH, 0 indicates LOW
Remark:

get DO value

Class Name: DIO

Method: int GetOutputSignal(int port);
Inputs: <port> the port index, from 0 to 3 mapping to DO0~DO3
Return Values: 1 indicates HIGH, 0 indicates LOW
Remark:

Set the DO value to High

Class Name: DIO

Method: bool SetOutputHigh(int port);
Inputs: <port> the port index, from 0 to 3 mapping to DO0~DO3
Return Values: true indicates success, otherwise the function fails
Remark:

Set the DO value to Low

Class Name: DIO

Method: bool SetOutputLow(int port);
Inputs: <port> the port index, from 0 to 3 mapping to DO0~DO3
Return Values: true indicates success, otherwise the function fails
Remark:

Watchdog

startup a watchdog

Class Name: Watchdog

Method: bool Open(int nTime);
Inputs: <time> the watchdog refresh time interval in milliseconds.
Return Values: True on success, false indicates failure.
Remark: After calling the open(), you must call refresh() in the specified time(nTime) or the system will be triggered rebooting.

The watchdog refresh function call.

Class Name: Watchdog

Method: bool refresh();
Inputs: none
Return Values: true indicates the watchdog refresh succeed, false indicates refresh failure.

Remark:

close the watchdog handle

Class Name: Watchdog

Method: bool close();
Inputs: none
Return Values: true indicates the watchdog refresh succeed, false indicates refresh failure.
Remark:

Buzzer

Open the buzzer

Class Name: Buzzer

Method: bool Open();
Inputs: none
Return Values: none
Remark:

Close the buzzer

Class Name: Buzzer

Method: void Close();
Inputs: none
Return Values: none
Remark:

Enable the buzzer voice for a specified time.

Class Name: DIO

Method: bool Beep(int time);
Inputs: <time> the “beep” voice time in milliseconds.
Return Values: true on success, false, the function fails
Remark:

Visual C# Examples

A device .Net CF 3.5 class library (mxdevice.dll) is provided to simplify application development

with Visual Studio 2005 tools. This library covers the .Net CF Class Library for the buzzer, and digital I/O devices. To link the library with your Visual Studio 2005 project environment, perform the following steps from your Visual Studio 2005 tool:

1. Copy the library file mxdevice.dll to any folder on your local disk.
2. This file can be found on the product CD in the folder \sdk\dot Net Compact Framework Library, or the file can be downloaded from the FTP site listed in the NOTE at the bottom of this page.
3. Open the Visual Studio 2005 IDE tool, and then add a new C# Smart device console application.
4. Enter the project name and location path.
5. In the Solution Explorer View, add mxdevice.dll to the reference section.
6. Click OK.

NOTE: You may need to copy the "mxdevice.dll" within the example when you try to execute the program.